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**PC - OPTIONS**  
**Volume 1: Internal Control Units**  
**Customer Engineer Manual**

A Publication of:

**DIGITAL EQUIPMENT ENTERPRISE bv**  
**Customer Service Technical Operations**  
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3	2		<p>10.1-1, 12.1-1, 13.1-1/2, 15.1-1, 16.1-1, 18.1-1, 20.1-1, 21.1-1, 22.1-1</p>	8909	<p>P2120, P2230, P3120, P3230, P3345, P3360, P9135 and P9165 added in cross reference table</p>

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**PC - OPTIONS**  
**Volume 2: Internal/External Devices**

**Customer Engineer Manual**



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## PREFACE

This manual describes options used in the Philips PC range. It is written in a format intended to provide a common structure throughout all Customer Engineer Manuals. This is of benefit as information of a certain type is now in a set location in any manual (for example DC/LAN Control Units are covered in chapter 15). Chapters 1-9 are covered by the CE manual applicable to the system.

If there is no item for a category for which there is a chapter allocated, then the chapter is omitted and its chapter number reserved for future use. The contents at the front of the manual lists the chapters. Sections and subsections contained in each chapter are listed at the beginning of the chapter. Section 1.1. of each chapter contains an option cross-reference guide, giving information about the system in which the options concerned are supported. There are two major divisions in the manual, their purpose is as follows:-

- 10 - 16 Device adapters and other controllers contained within the system units (Volume 1).
- 17 - 24 Devices and peripherals, both internal and external to the system units (Volume 2).

CHAPT 1 - 9 CEM P3101	CHAPT 10 - 24  CEM PC-OPTIONS
CHAPT 1 - 9 CEM P3102/P3105/NMS9100	
CHAPT 1 - 9 CEM P3200/P3202/P3204/P3400	
CHAPT 1 - 9 CEM P3301	
CHAPT 1 - 9 CEM P3302/P9130/P9160	
CHAPT 1 - 9 CEM P3360/P9135/P9165	
CHAPT 1 - 9 CEMS P2120/P2230/P3345/P3350/ P3370/HEADSTART 3XX	





## 17. FLOPPY DISK DRIVES

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1: Technical Overview	17.1-1
1.1: Option Cross Reference Guide	17.1-1
1.2: Technical Data	17.1-3

2: Epson SD521	17.2-1	17.2-1	17.2-2	17.2-4	17.2-4	n.a.
3: Shugart SA455	17.3-1	17.3-1	17.3-2	n.a.	17.3-3	n.a.
4: Shugart SA455-3AAA	17.4-1	17.4-1	17.4-2	n.a.	17.4-3	n.a.
5: Panasonic JU455-5AAA	17.5-1	17.5-1	17.5-2	n.a.	17.5-3	n.a.
6: Panasonic JU455-5AAG	17.6-1	17.6-1	17.6-2	n.a.	17.6-3	n.a.
7: Panasonic JU-455-7xxx	17.7-1	17.7-1	17.7-2	17.7-3	17.7-3	n.a.
8: Panasonic JU-364-322K	17.8-1	17.8-1	17.8-2	17.8-3	17.8-3	n.a.
9: NEC 1053	17.9-1	17.9-2	17.9-3	17.9-5	17.9-5	n.a.
10: NEC 1155C	17.10-1	17.10-2	17.10-3	17.10-4	17.10-4	n.a.
11: NEC 1157C	17.11-1	17.11-2	17.11-3	17.11-4	17.11-4	n.a.
12: Panasonic JU-475-2	17.12-1	17.12-2	17.12-3	n.a.	17.12-4	n.a.
13: Epson SMD-440L/449L	17.13-1	17.13-2	17.13-3	n.a.	17.13-4	n.a.
14: Epson SMD-480L/489L	17.14-1	17.14-2	17.14-3	n.a.	17.14-4	n.a.
15: Sony MP-F11W	17.15-1	17.15-2	17.15-3	17.15-4	17.15-4	n.a.
16: Sony MP-F17W	17.16-1	17.16-2	17.16-3	17.16-4	17.16-4	n.a.

Subsection:

1	Characteristics	
2	Connections	
3	Strap Settings / Adjustments	
4	Modification History	
5	Installation / Maintenance	
6	Diagnostic Functions	

**NOTE:** n.a. means that this section is not available for this unit.

17: Panasonic JU-475-3	1.2	17.17-1	17.17-1	17.17-3	n.a.	17.17-4	n.a.
18: Panasonic JU-475-4	1.2	17.18-1	17.18-1	17.18-3	n.a.	17.18-4	n.a.
19: Epson SMD 340 349	1.4	17.19-1	17.19-1	17.19-3	n.a.	17.19-4	n.a.
20: Panasonic JU-257-3P		17.20-1	17.20-1	17.20-3	n.a.	17.20-4	n.a.
21: TEAC FD235HF		17.21-1	17.21-1	17.21-3	n.a.	17.21-4	n.a.

Subsection:

1	Characteristics	_____	↑
2	Connections	_____	↑
3	Strap Settings / Adjustments	_____	↑
4	Modification History	_____	↑
5	Installation / Maintenance	_____	↑
6	Diagnostic Functions	_____	↑

**NOTE:** n.a. means that this section is not available for this unit.

## 17.1. TECHNICAL OVERVIEW

### 17.1.1. Option Cross Reference Guide

OPTION	P 2 1 2 0	P 2 2 3 0	A V E N G	P31xx					P32xx					P33xx										P 3 4 6 4	P 3 4 0 0	P91xx				
				0	0	0	0	2	0	0	0	0	3	3	0	0	4	4	5	6	6	7	7			3	3	6	6	7
				1	2	2	5	0	0	0	2	4	0	8	1	2	5	8	0	0	1	0	0			0	5	0	5	0
2: Epson SD521				X																										
3: Shugart SA455				X																										
4: Shugart SA455-3AAA				X	X																									
5: Panasonic JU455-5AAA				X	X	X	X							X									X							
6: Panasonic JU455-5AAG				X	X	X	X																							
7: Panasonic JU-455-7xxx			X	X	X	X	X	X		X	X	X	X		X	X		X	X		X			X	X	X	X			
8: Panasonic JU-364-322K							X		X	X		X																		
9: NEC 1053									X	X	X	X			X								X							
10: NEC 1155C									X	X	X	X											X							
11: NEC 1157C			X							X	X				X	X		X	X		X		X	X	X	X	X			
12: Panasonic JU-475-2														X																
13: Epson SMD-440L/449L	X	X	X				X			X	X	X	X		X	X		X	X	X	X			X	X	X	X			
14: Epson SMD-480L/489L	X	X	X				X	X		X	X	X	X		X	X		X	X		X			X	X	X	X			
15: Sony MP-F11W	X									X					X			X						X	X	X	X			
16: Sony MP-F17W	X	X								X	X	X			X	X	X	X	X	X	X	X		X	X	X	X			
17: Panasonic JU-475-3										X	X	X	X		X	X		X	X		X									
18: Panasonic JU-475-4										X	X	X	X		X	X		X	X		X									
19: Epson SMD-340/349	X	X										X	X			X	X	X	X	X	X	X								
20: Panasonic JU-457-3																			X											

## 17.1.2. Technical Data

SPECIFICATION FLOPPY DRIVES	EPSON SD521	SHUGART SA455 SA455-3AAA	PANASONIC JU455-5AAA JU455-5AAG	PANASONIC JU-455-7xxx
CAPACITY				
Unformatted	500 KB	500 KB	500 KB	500 KB
Formatted	320 KB	320 360 KB	320 360 KB	320 360 KB
Nr of Sides	2	2	2	2
Nr of Tracks	40	40	40	40
Nr of Sectors	8	8 9	8 9	8 9
Nr of Byte sector	512	512	512	512
Used Media	S FD 10 Standard Density	S FD 10 Standard Density	S FD 10 Standard Density	S FD 10 Standard Density
Rotational Speed	300 RPM	300 RPM	300 RPM	300 RPM
Transfer Rate	250 Kbits sec	250 Kbits sec	250 Kbits sec	250 Kbits sec
Track Density	48 TPI	48 TPI	48 TPI	48 TPI
Recording Density	5876 Bits Inch	5876 Bits Inch	5876 Bits Inch	5876 Bits Inch
Recording Method	FM MFM	FM MFM	FM MFM	MFM
ACCESS TIME				
Track to Track	6 ms	6 ms	4 ms	4 ms
Average Latency	97 ms	93 ms	53 ms	53 ms
Settling Time	15 ms	15 ms	15 ms	
Motor Start Time	0.5 s	0.5 s	0.5 s	0.5 s
POWER CONSUMPTION				
+5V	0.4 A	0.9 A	0.4 A	0.37 A
+5V Start-Up	0.55 A	0.6 A · 0.7A	0.6 A	0.4 A
+12V	0.35 A	0.6 A · 0.75A	0.6 A	0.19 A
+12V Start-Up	1.2 A	1.2 A	0.9 A	0.55 A
Dimensions (mm)	146 × 195.5 × 41.4	146 × 203 × 41.4	146 × 203 × 41	
Weight (gr)	1300	1500	1300	1300



SPECIFICATION FLOPPY DRIVES	PANASONIC JU-364-322K	NEC 1053	NEC 1155C / 1157C	
			LOW DENSITY SINGLE SPEED MODE	HIGH DENSITY SINGLE SPEED MODE
CAPACITY				
Unformatted	1 MB	500 KB	1 MB	1.67 MB
Formatted	720 KB	360 320 KB	360 320 KB	1200 KB
Nr of Sides	2	2	2	2
Nr of Tracks	80	40	40	80
Nr of Sectors	9	8 9	8 9	15
Nr of Byte sector	512	512	512	512
Used Media	S FD 41 Standard Density	S FD 10 48 TPI	S FD 10 48 TPI	S FD 18,S FD 19 96 TPI
Rotational Speed	300 RPM	300 RPM	360 RPM	360 RPM
Transfer Rate	250 Kbits/sec	250 Kbits/s	300 Kbits/s	500 Kbits/s
Track Density	135 TPI	48 TPI	48 TPI	96 TPI
Recording Density	8717 Bits Inch	5876 Bits Inch	5922 Bits Inch	9870 Bits Inch
Recording Method	FM MFM	FM MFM	FM MFM	FM MFM
ACCESS TIME				
Track to Track	3 ms	6 ms	3 ms	3 ms
Average Latency				
Settling Time	15 ms		35 ms	35 ms
Motor Start Time	0.5 s	500 ms	800 ms	800 ms
POWER CONSUMPTION				
+ 5V	0.22 A	460 mA	460 mA	460 mA
+ 5V Start-Up	0.25 A	460 mA	460 mA	460 mA
+ 12V	0.12 A	210 mA	210 mA	210 mA
+ 12V Start-Up	0.2 A	460 mA	390 mA	390 mA
Dimensions (mm)	102 × 150 × 32			
Weight (gr)	550			



SPECIFICATION FLOPPY DRIVES	PANASONIC JU-475-2		EPSON SMD-440L/449L	
	STANDARD DENSITY	HIGH DENSITY	STANDARD DENSITY	HIGH DENSITY
CAPACITY				
Unformatted	1000 KB	1.67 MB	1000 KB	2000 KB
Formatted	320 / 360 KB	1200 KB	720 KB	1440 KB
Nr of Sides	2	2	2	2
Nr of Tracks	40	80	80	80
Nr of Sectors	8.9	15	9	18
Nr of Byte/sector	512	512	512	512
Used Media	S FD 10 Standard Density	S FD 18 19 High Density	3.5 inch S.FD 40.41 Standard Density	3.5 inch S.FD 40.41/42 High Density
Rotational Speed	360 RPM	360 RPM	300 RPM	300 RPM
Transfer Rate	300 Kbits/sec	500 Kbits/sec	250 Kbits/sec	500 Kbits/sec
Track Density	48 TPI	96 TPI	135 TPI	135 TPI
Recording Density	5922 Bits/Inch	9870 Bits/Inch	8717 Bits/Inch	17434 Bits/Inch
Recording Method	FM / MFM	FM / MFM	MFM	MFM
ACCESS TIME				
Track to Track			3 ms	3 ms
Average Latency			100 ms	100 ms
Settling Time			15 ms	15 ms
Motor Start Time			0.5 s	0.5 s
POWER CONSUMPTION				
C-MOS Type				
+5V Operation			0.36 A	0.36 A
+5V Maximum			0.95 A	0.95 A
TTL Type				
+5V Operation			0.39 A	0.39 A
+5V Maximum			1.0 A	1.0 A
Dimensions (mm)			101.6x149.5x25.4	101.6x149.5x25.4
Weight (gr)			550	550

SPECIFICATION FLOPPY DRIVES	EPSON SMD-480L/489L	SONY MP-F11W	SONY MP-F17W	
			STANDARD DENSITY	HIGH DENSITY
CAPACITY				
Unformatted	1000 KB	1000 KB	1000 KB	2000 KB
Formatted	720 KB	720 KB	720 KB	1440 KB
Nr of Sides	2	2	2	2
Nr of Tracks	80	80	80	80
Nr of Sectors	9	9	9	18
Nr of Byte sector	512	512	512	512
Used Media	3.5 inch S FD 40/41 Standard Density	3.5 inch S FD 40/41 Standard Density	3.5 inch S FD 40/41 Standard Density	3.5 inch S FD 40/41/42 High Density
Rotational Speed	300 RPM	300 RPM	300 RPM	300 RPM
Transfer Rate	250 Kbits/sec	250 Kbits/sec	250 Kbits/sec	500 Kbits/sec
Track Density	135 TPI	135 TPI	135 TPI	135 TPI
Recording Density	8717 Bits/Inch	8717 Bits/Inch	8717 Bits/Inch	17434 Bits/Inch
Recording Method	MFM	MFM	MFM	MFM
ACCESS TIME				
Track to Track	3 ms			
Average Latency	100 ms			
Settling Time	15 ms			
Motor Start Time	0.5 s			
POWER CONSUMPTION				
C-MOS Type				
+5V Operation	0.36 A			
+5V Maximum	0.95 A			
TTL Type				
+5V Operation	0.39 A			
+5V Maximum	1.0 A			
Dimensions (mm)	101.6x149.5x25.4			
Weight (gr)	550			

SPECIFICATION FLOPPY DRIVES	PANASONIC JU-475-3	PANASONIC JU-475-4	EPSON SMD 340/349	
			STANDARD DENSITY	HIGH DENSITY
CAPACITY				
Unformatted	1.67 MB	1.67 MB	1000 KB	200 KB
Formatted	1.2 MB	1.2 MB	720 KB	1440 KB
Nr of Sides	2	2	2	2
Nr of Tracks	80	80	80	80
Nr of Sectors	15	15	9	18
Nr of Byte sector	512	512	512	512
Used Media	5 $\frac{1}{4}$ inch S/FD 19 High Density	5 $\frac{1}{4}$ inch S/FD 19 High Density	3 $\frac{1}{2}$ inch Standard Density	3 $\frac{1}{2}$ inch High Density
Rotational Speed	360 RPM	360 RPM	300 RPM	300 RPM
Transfer Rate	500 Kbits/sec	500 Kbits/sec	250 Kbits/sec	500 Kbits/sec
Track Density	96 TPI	96 TPI	135 TPI	135 TPI
Recording Density	9870 Bits/Inch	9870 Bits/Inch	8717 Bits/Inch	17434 Bits/Inch
Recording Method	FM-MFM	FM MFM		
ACCESS TIME				
Track to Track	3 ms	3 ms	3 ms	3 ms
Average Latency	83 ms	83 ms	100 ms	100 ms
Settling Time	15 ms	15 ms	15 ms	15 ms
Motor Start Time	500 ms	500 ms	500 ms	500 ms
POWER CONSUMPTION				
C-MOS Type				
+ 5V Operation				
+ 5V Maximum				
TTL Type				
+ 5V Operation	0.43 A			
+ 5V Maximum	0.5 A		0.9 A	0.9 A
+ 12V Operation	0.26 A			
+ 12V Maximum	0.54 A			
+ 12V Peak	0.9 A			
Dimensions (mm)	146x41.5x196.5	146x41.5x196.5	101.6x149.5x25.4	101.6x149.5x25.4
Weight (gr)	1300	1300	395	395

SPECIFICATION FLOPPY DRIVES	PANASONIC JU-457-3P	TEAC FD235HF
CAPACITY		
Unformatted	2000KB	2000KB
Formatted	1440KB	1440KB
Nr of Sides	2	2
Nr of Tracks	80	80
Nr of Sectors	18	18
Nr of Byte sector	512	512
Used Media	5 $\frac{1}{4}$ inch S.FD 40 41 42 High Density	3 $\frac{1}{2}$ inch S.FD 40 41 42 High Density
Rotational Speed	300 RPM	300 RPM
Transfer Rate	500 Kbits sec	500 Kbits sec
Track Density	135 TPI	135 TPI
Recording Density	17,434 Bits Inch	17,434 Bits Inch
Recording Method	FM.MFM	FM.MFM
ACCESS TIME		
Track to Track	3 ms	3 ms
Average Latency	83 ms	94 ms
Settling Time	15 ms	15 ms
Motor Start Time	500 ms	500 ms
POWER CONSUMPTION		
C-MOS Type		
+ 5V Operation		
+ 5V Maximum		
TTL Type		
+ 5V Operation	0.14 A	
+ 5V Maximum	0.15 A	0.76 A
+ 12V Operation	0.26 A	
+ 12V Maximum	0.30 A	
+ 12V Peak	0.30 A	
Dimensions (mm)	101.6x150x25.4	101.6x145x25.4
Weight (gr)	380	370





## 17.2. EPSON SD521

### 17.2.1. Characteristics Epson SD521

The Epson SD521 is a 5 1/4" half height floppy disk drive.

### 17.2.2. Connections Epson SD521

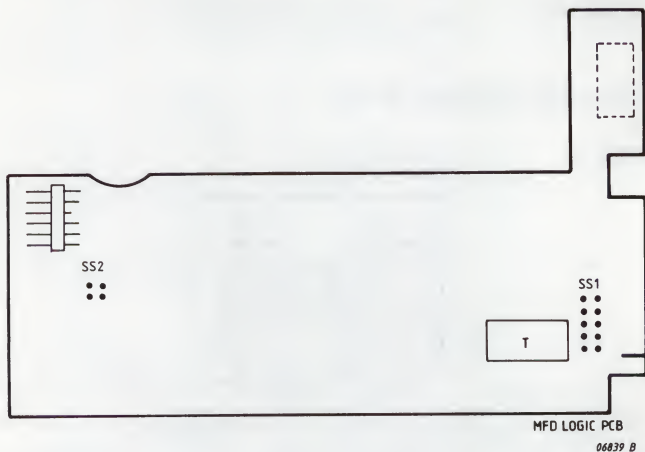
Power Connector J1

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

Interface Connector J2

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	N.C.
3	4	IN USE-N
5	6	DRIVE SELECT 3-N
7	8	INDEX-N
9	10	DRIVE SELECT 0-N
11	12	DRIVE SELECT 1-N
13	14	DRIVE SELECT 2-N
15	16	MOTOR ON-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	READY

### 17.2.3. Strap Settings / Adjustments Epson SD521



T = TERMINATOR

SS2 SS1

1	<input type="checkbox"/>	DS3	<input type="checkbox"/>
2	<input type="checkbox"/>	DS2	<input type="checkbox"/>
	<input type="checkbox"/>	DS1	<input type="checkbox"/>
		DS0	<input type="checkbox"/>
		MX	<input type="checkbox"/>

MX	DS0	DS1	DS2	DS3	FUNCTION
OUT	IN	OUT	OUT	OUT	Drive selected at DS0
OUT	OUT	IN	OUT	OUT	Drive selected at DS1
OUT	OUT	OUT	IN	OUT	Drive selected at DS2
OUT	OUT	OUT	OUT	IN	Drive selected at DS3
IN	OUT	OUT	OUT	OUT	Always selected

SS1 Setting

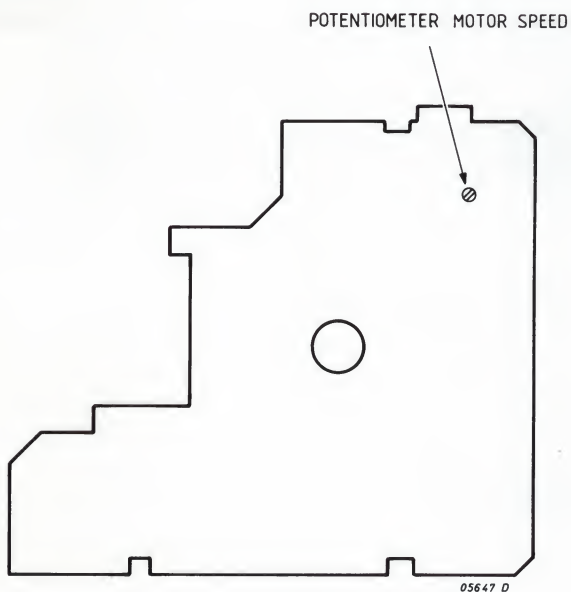
1	2	FUNCTION
IN	OUT	LED ON/OFF at drive select
OUT	IN	LED ON when MOTOR ON, IN USE and DRIVE SELECT active

SS2 Setting

The A- and B-drive terminators are not alike. A number of pins of the B-terminator have to be cut.

TERMINATOR	A		B		
	0 1	14	0	X	0 = PIN
	0	0	0	X	X = NO PIN
	0	0	0	X	
	0	0	0	0	
	0	0	X	0	
	0	0	X	0	
	0	0	X	0	

# Motor Control Board Epson SD521



#### 17.2.4. Modification History Epson SD521

SI-NR	SUBJECT
P3100-011	Terminator jumper on the Epson SD521 floppy drives if system is equipped with two floppy drives.

#### 17.2.5. Installation / Maintenance Epson SD521

The Epson SD521 should be installed horizontally.

MAINTENANCE & CHECK ITEM	REMEDY
Foreign matter inside the body	Remove the foreign matter
Lubrication Points	Lubricate if necessary
Dirty Head	Clean with head cleaning disk
Dirt, Fluff, Dust	Clean with cotton swab

## 17.3. SHUGART SA455

### 17.3.1. Characteristics Shugart SA455

The Shugart SA455 is a 5 1/4" half height floppy disk drive.

### 17.3.2. Connections Shugart SA455

Interface Connector J1

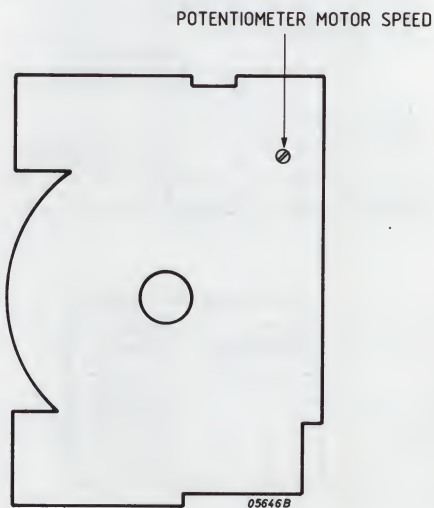
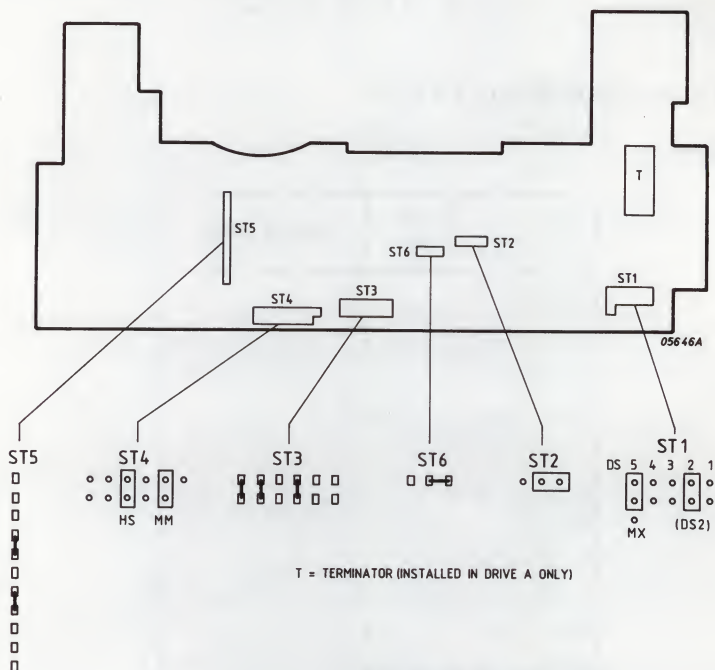
GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	N.C.
3	4	N.C.
5	6	DRIVE SELECT 4-N
7	8	INDEX-N
9	10	DRIVE SELECT 1-N
11	12	DRIVE SELECT 2-N
13	14	DRIVE SELECT 3-N
15	16	MOTOR ON-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	N.C.

Power Connector J2

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

### 17.3.3. Strap Settings / Adjustments Shugart SA455

**NOTE:** The drive should always be strapped as drive 1.





### **17.3.5. Installation / Maintenance Shugart SA455**

The drives should be installed in a horizontal position between the two vertical drive mounting plates, the terminating resistor must always be present in the uppermost drive (drive A), and not present in any other drive in the daisy chain.



## 17.4. SHUGART SA455-3AAA

### 17.4.1. Characteristics Shugart SA455-3AAA

The Shugart SA455-3AAA is a  $5\frac{1}{4}$ " half height floppy disk drive featuring a low noise mechanism and a reduced component count control PCB.

### 17.4.2. Connections Shugart SA455-3AAA

Interface Connector J1

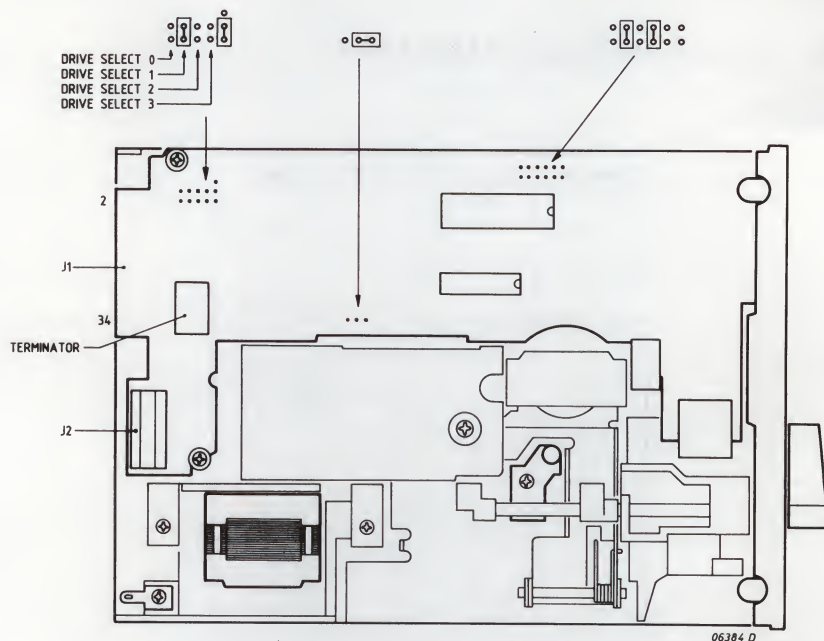
GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	N.C.
3	4	N.C.
5	6	DRIVE SELECT 4-N
7	8	INDEX-N
9	10	DRIVE SELECT 1-N
11	12	DRIVE SELECT 2-N
13	14	DRIVE SELECT 3-N
15	16	MOTOR ON-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	N.C.

Power Connector J2

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

### 17.4.3. Strap Settings / Adjustments Shugart SA455-3AAA

**NOTE:** The drive should always be strapped as drive 1.



DEFAULT SETTING SHOWN

#### 17.4.5. Installation / Maintenance Shugart SA455-3AAA

The drives should be installed in a horizontal position between the two vertical drive mounting plates. The terminating resistor must always be present in the uppermost drive (drive A), and not present in any other drive in the daisy chain. Whenever the drive is removed, always keep the two black plastic slides that the drive is supported by. Drives ordered as spare parts will *not* have these slides.

When installing a drive, the slides are adjustable to enable the drives to be installed without a gap between them.





## 17.5. PANASONIC JU455-5AAA

### 17.5.1. Characteristics Panasonic JU455-5AAA

The Panasonic JU455-5AAA is a 5¼" half height floppy disk drive featuring a low noise mechanism and a reduced component count control PCB.

### 17.5.2. Connections Panasonic JU455-5AAA

Interface Connector J1

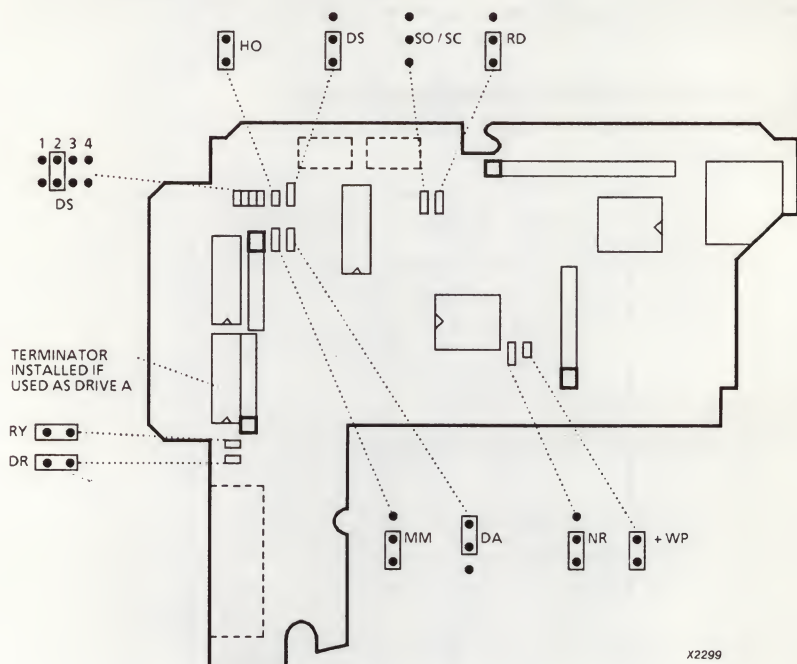
GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	N.C.
3	4	N.C.
5	6	DRIVE SELECT 3-N
7	8	INDEX-N
9	10	DRIVE SELECT 0-N
11	12	DRIVE SELECT 1-N
13	14	DRIVE SELECT 2-N
15	16	MOTOR ON-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	N.C.

Power Connector J2

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

### 17.5.3. Strap Settings / Adjustments Panasonic JU455-5AAA

**NOTE:** The drive should always be strapped as drive 1.



### 17.5.5. Installation / Maintenance Panasonic JU455-5AAA

The drives should be installed in a horizontal position between the two vertical drive mounting plates. The terminating resistor must always be present in the uppermost drive (drive A), and not present in any other drive in the daisy chain. Whenever the drive is removed, always keep the two black plastic slides that the drive is supported by. Drives ordered as spare parts will *not* have these slides.

When installing a drive, the slides are adjustable to enable the drives to be installed without a gap between them.



## 17.6. PANASONIC JU455-5AAG

### 17.6.1. Characteristics Panasonic JU455-5AAG

The Panasonic JU455-5AAG is a 5 $\frac{1}{4}$ " half height floppy disk drive featuring a low noise mechanism and a new type reduced component count control PCB.

### 17.6.2. Connections Panasonic JU455-5AAG

Interface Connector J1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	N.C.
3	4	N.C.
5	6	DRIVE SELECT 4-N
7	8	INDEX-N
9	10	DRIVE SELECT 1-N
11	12	DRIVE SELECT 2-N
13	14	DRIVE SELECT 3-N
15	16	MOTOR ON-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	N.C.

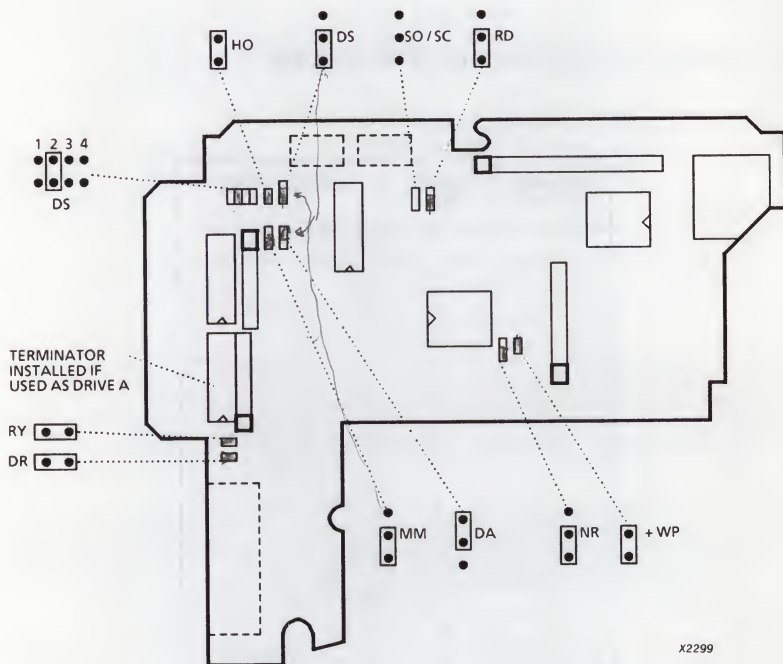
Power Connector J2

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC



### 17.6.3. Strap Settings / Adjustments Panasonic JU455-5AAG

**NOTE:** The drive should always be strapped as drive 1 (strap for DS2).



Default Settings Shown



### **17.6.5. Installation / Maintenance Panasonic JU455-5AAG**

Whenever the drive is removed, always keep the two black plastic slides that the drive is supported by. Drives ordered as spare parts will *not* have these slides.

When installing a drive, the slides are adjustable to enable the drives to be installed without a gap between them.



## 17.7. PANASONIC JU-455-7xxx

### 17.7.1. Characteristics Panasonic JU-455-7xxx

The Panasonic JU-455-7xxx is a 5¼" half height floppy disk drive featuring a low noise mechanism and a reduced component count control PCB.

### 17.7.2. Connections Panasonic JU-455-7xxx

Interface Connector J1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	N.C.
3	4	IN USE
5	6	DRIVE SELECT 4-N
7	8	INDEX-N
9	10	DRIVE SELECT 1-N
11	12	DRIVE SELECT 2-N
13	14	DRIVE SELECT 3-N
15	16	MOTOR ON-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	READY-N

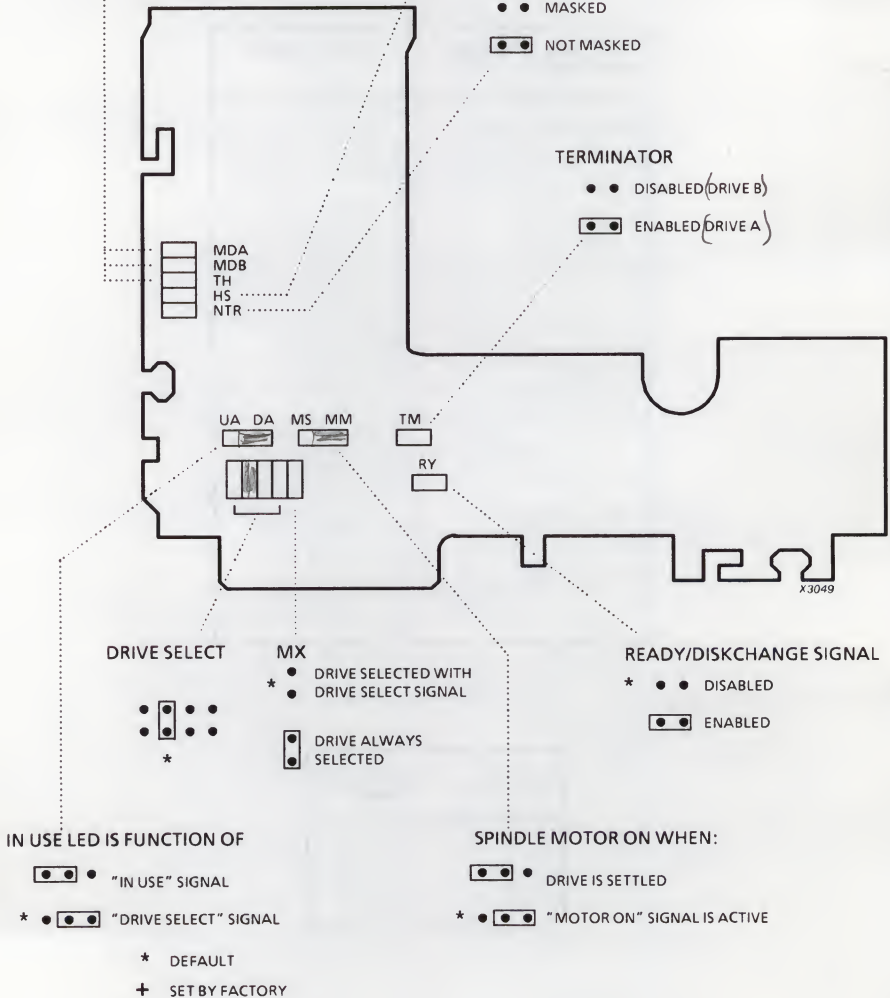
Power Connector J2

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

### 17.7.3. Strap Settings / Adjustments Panasonic JU-455-7xxx

**NOTE:** The drive should always be strapped as drive 2.

+	TH	MDB	MDA	PIN # 34
	IN	IN	IN	LOW WHEN READY HIGH
	OUT	IN	IN	LOW WHEN READY AND DRIVE SELECT HIGH
	OUT	IN	OUT	LOW DURING POWER UP, OR DOOR IS OPEN
	OUT	OUT	OUT	LOW IF DOOR IS OPEN
	IN	OUT	OUT	HIGH IF DOOR IS OPEN





#### 17.7.4. Modification History Panasonic JU-455-7xxx

SI-NR	SUBJECT
P3000-076	Introduction of new model Panasonic flex drive (JU-455-7A11)

#### 17.7.5. Installaton / Maintenance Panasonic JU-455-7xxx

- Disconnect the cables
- Remove the two screws at the front
- Shift the drive towards the front



## 17.8. PANASONIC JU-364-322K

### 17.8.1. Characteristics Panasonic JU-364-322K

The Panasonic JU-364-322K is a 3.5 inch, 32mm high, floppy disk drive featuring a low noise mechanism and a reduced-component-count control PCB.

### 17.8.2. Connections Panasonic JU-364-322K

Interface Connector J1

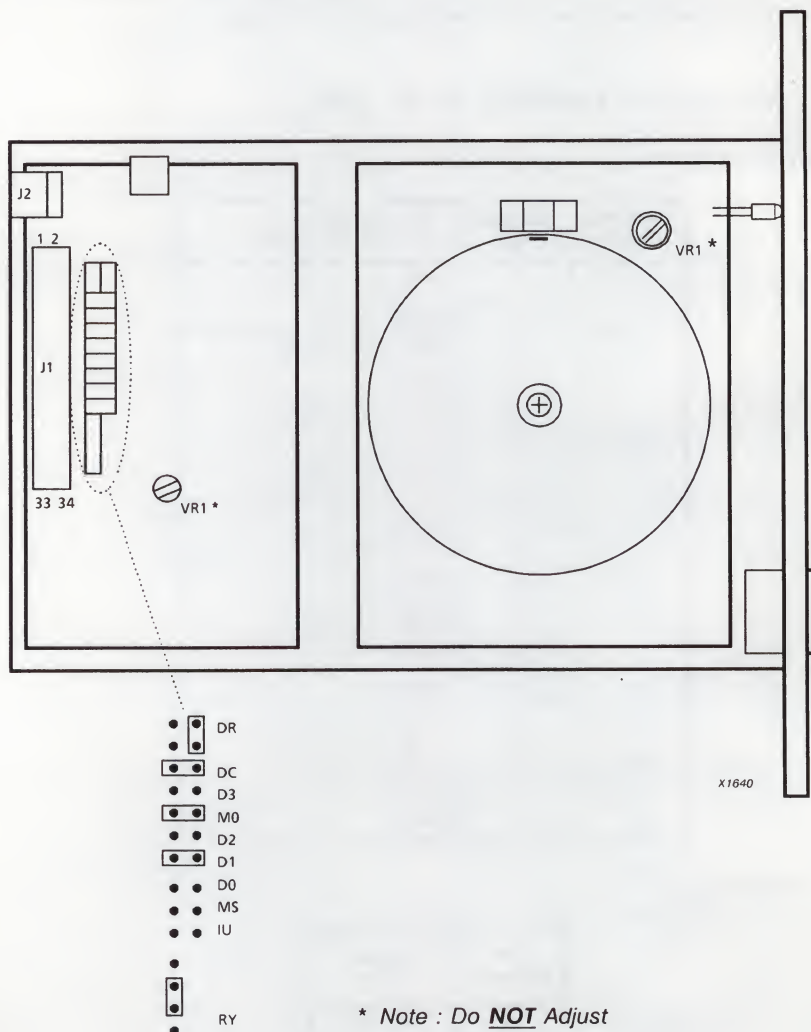
GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	Not Used
3	4	IN USE
5	6	DRIVE SELECT 3-N
7	8	INDEX-N
9	10	DRIVE SELECT 0-N
11	12	DRIVE SELECT 1-N
13	14	DRIVE SELECT 2-N
15	16	MOTOR ON-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 00-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	RDY

Power Connector J2

PIN NUMBER	SIGNAL NAME
1	+ 5 VDC
2	GROUND
3	GROUND
4	+ 12 VDC

### 17.8.3. Strap Settings / Adjustments Panasonic JU-364-322K

#### Strap Settings Panasonic JU-364-322K



The strap setting as shown in the figure above is valid for drive A as well as drive B.

#### 17.8.4. Modification History Panasonic JU-364-322K

SI-NR	SUBJECT
P3000-085	Replacement for the Panasonic FDD by EPSON or SONY 3.5 inch floppy drives.

#### 17.8.5. Installation / Maintenance Panasonic JU-364-322K

The drive slots in the system chassis are of the appropriate size to receive 5.25 inch half-height storage devices. Therefore the 3.5 inch drive must be mounted with the aid of the proper Floppy Mounting Bracket, which fills the space, provides the proper screw holes and centers the drive in the opening.





## **17.9. NEC 1053**

### **17.9.1. Characteristics NEC 1053**

The NEC 1053 is a 5.25" half height Double Sided/Double Density 360 kbyte floppy disk drive. The drive is available as an option kit containing the drive mounted on a metal Slide-In mechanism.

## 17.9.2. Connections NEC 1053

### Power Connector P1

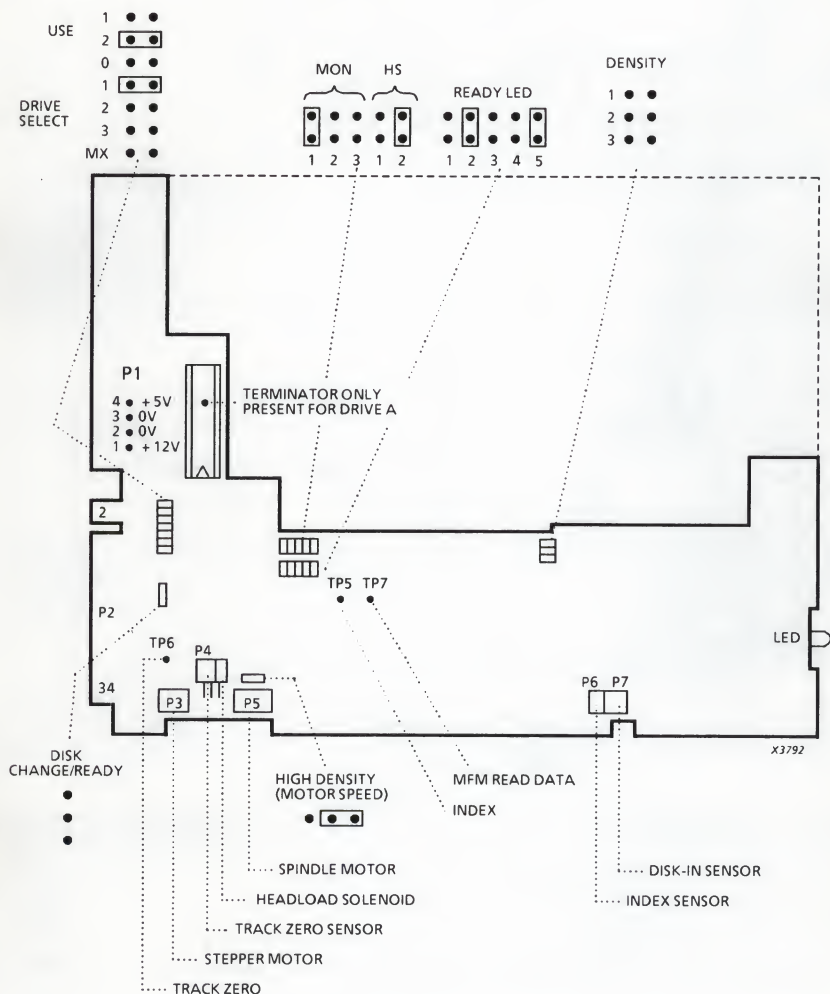
PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

### Interface Connector P2

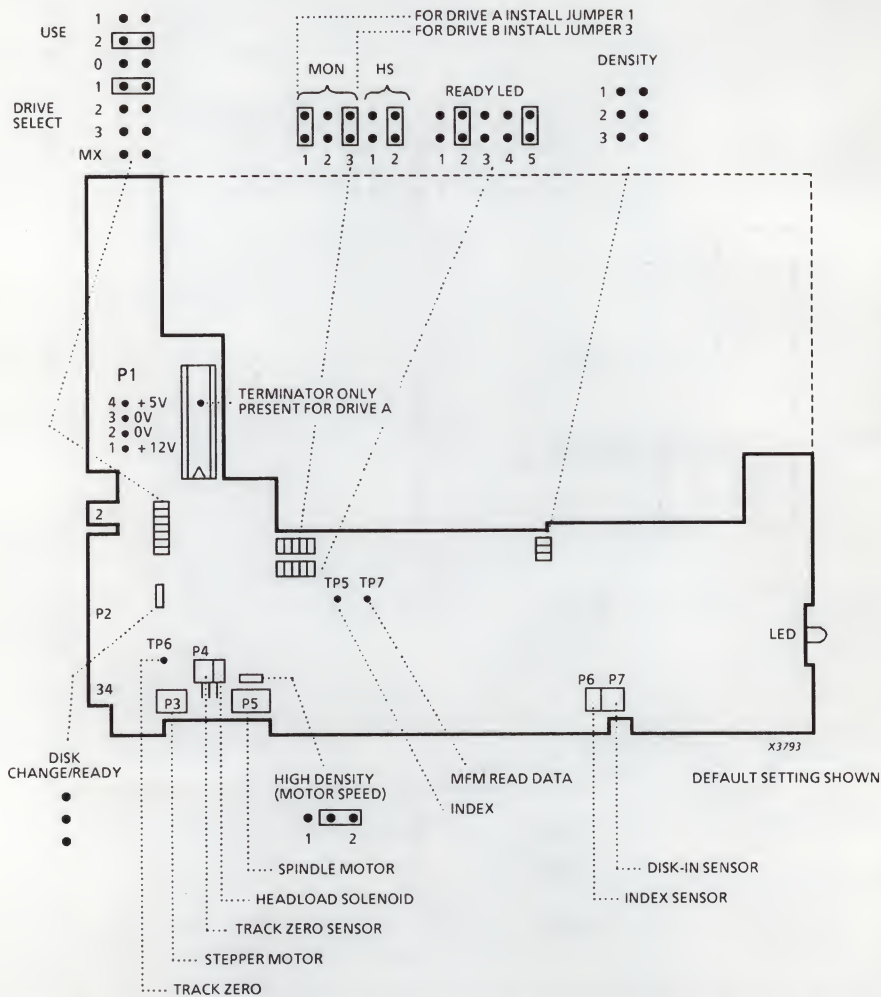
GROUND RETURN	SIGNAL PIN	SIGNAL NAME	I/O
1	2	N.C.	
3	4	HEAD LOAD/IN USE-N	I
5	6	DRIVE SELECT 3-N	I
7	8	INDEX-N	O
9	10	DRIVE SELECT 0-N	I
11	12	DRIVE SELECT 1-N	I
13	14	DRIVE SELECT 2-N	I
15	16	MOTOR ON-N	I
17	18	DIRECTION-N	I
19	20	STEP-N	I
21	22	WRITE DATA-N	I
23	24	WRITE GATE-N	I
25	26	TRACK 00-N	O
27	28	WRITE PROTECT-N	O
29	30	READ DATA-N	O
31	32	SIDE SELECT-N	I
33	34	N.C.	O

### 17.9.3. Strap Settings / Adjustments NEC 1053

Strap Locations 1053 (Rev. level below G9VLX-D5):



# Strap Locations 1053 (Rev. level G9VLX-E6 and higher):



**NOTE :** CUT CONNECTION TO PIN 34 ON P2 IF IT IS NOT CONNECTED TO THE MIDDLE PIN OF THE DCG STRAP



#### 17.9.4. Modification History NEC 1053

SI-NR	SUBJECT
P3200-020	Strap setting second flexible drive (drive B) revision E6 and higher

From revision level G9VLX-D5 onwards the type of controller PCB is the same as used within the 1155C disk drive.

#### 17.9.5. Installation / Maintenance NEC 1053

##### **P3200 / P3202:**

In the space above the drive release the slide fastener (P3200 model 1), or unscrew the two screws (P3200 model 2 / P3202). Shift the drive forward, note the orientation of power cable and the ribbon cable attached, and separate them from the drive. Pull the drive out of the system and set it aside.

##### **P3204:**

The drive is secured by two screws on each side of the drive. The left side screws might be hidden by the possible presence of the hard disk assembly .

##### **P3302:**

- Disconnect the cables
- Remove the two screws at the front
- Shift the drive out towards the front

To install the drive, reverse this procedure. Make certain that the edges of its mounting plate enter the rail on both sides of the frame.

If the drive is used as drive "A:" a terminator block must be present.



## **17.10. NEC 1155C**

### **17.10.1. Characteristics NEC 1155C**

The NEC 1155C is a 5.25" half height Double Sided/High Density 1.2MB floppy disk drive. The drive is available as an option kit containing the drive mounted on a metal Slide-In mechanism.

The 1155C can operate in either the high density mode or in the normal density mode. The normal density mode is used to read double density formatted (360KB) media. Selection of the density mode is done automatically by firmware when the formatted medium is loaded.

#### **WARNING:**

Only high density medium (S/FD 19, 96TPI) may be written by this drive. If a double density medium (S/FD 10, 48TPI) is written by this drive, reading on a double density drive is not guaranteed.

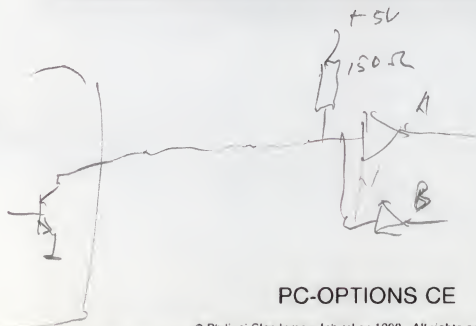
## 17.10.2. Connections NEC 1155C

### Power Connector P1

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

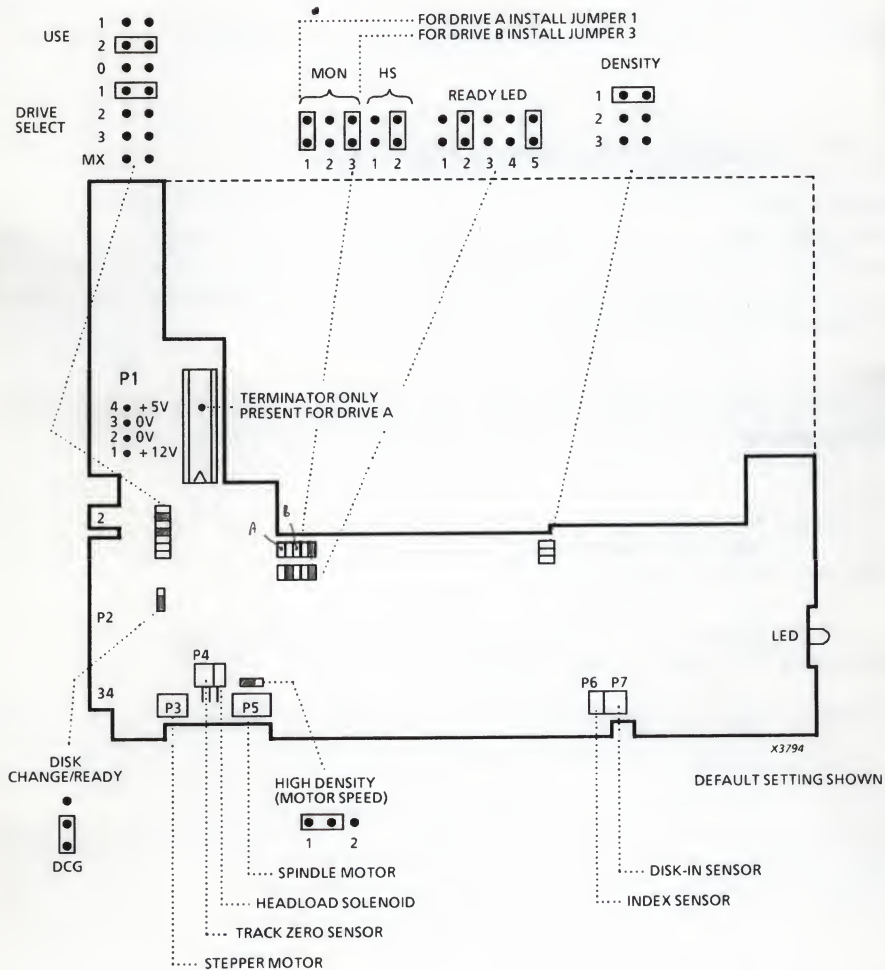
### Interface Connector P2

GROUND RETURN	SIGNAL PIN	SIGNAL NAME	I/O
1	2	HIGH , NORMAL DENSITY	I
3	4	HEAD LOAD/IN USE-N	I
5	6	DRIVE SELECT 3-N	I
7	8	INDEX-N	O
9	10	DRIVE SELECT 0-N	I
11	12	DRIVE SELECT 1-N	I
13	14	DRIVE SELECT 2-N	I
15	16	MOTOR ON-N	I
17	18	DIRECTION-N	I
19	20	STEP-N	I
21	22	WRITE DATA-N	I
23	24	WRITE GATE-N	I
25	26	TRACK 00-N	O
27	28	WRITE PROTECT-N	O
29	30	READ DATA-N	O
31	32	SIDE SELECT-N	I
33	34	DISK CHANGE/READY	O



## 17.10.3. Strap Settings / Adjustments NEC 1155C

strap locations 1155C





#### 17.10.4. Modification History NEC 1155C

SI-NR	SUBJECT
P3200-020	Strap setting second flexible drive (drive B) revision E6 and higher

#### 17.10.5. Installation / Maintenance NEC 1155C

##### **P3200 / P3202:**

In the space above the drive release the slide fastener (P3200 model 1), or unscrew the two screws (P3200 model 2 / P3202). Shift the drive forward, note the orientation of power cable and the ribbon cable attached, and separate them from the drive. Pull the drive out of the system and set it aside.

##### **P3204:**

The drive is secured by two screws on each side of the drive. The left side screws might be hidden by the possible presence of the hard disk assembly.

##### **P3302:**

- Disconnect the cables
- Remove the two screws at the front
- Shift the drive out towards the front

To install the drive, reverse this procedure. Make certain that the edges of its mounting plate enter the rail on both sides of the frame.

If the drive is used as drive "A:" a terminator block must be present.

## **17.11. NEC 1157C**

### **17.11.1. Characteristics NEC 1157C**

This drive is the successor of the NEC1155C. The NEC 1157C is a 5.25" half height Double Sided/High Density 1.2MB floppy disk drive. The drive is also available as an option kit containing the drive mounted on an metal Slide-In mechanism.

The 1157C can operate in either the high density mode or in the normal density mode. The normal density mode is used to read double density formatted (360KB) media. Selection of the density mode is done automatically by firmware when the formatted medium is loaded.

#### **WARNING:**

Only high density medium (S/FD 19, 96TPI) may be written by this drive. If a double density medium (S/FD 10, 48TPI) is written by this drive, reading on a double density drive is not guaranteed.

## 17.11.2. Connections NEC 1157C

### Power Connector P1

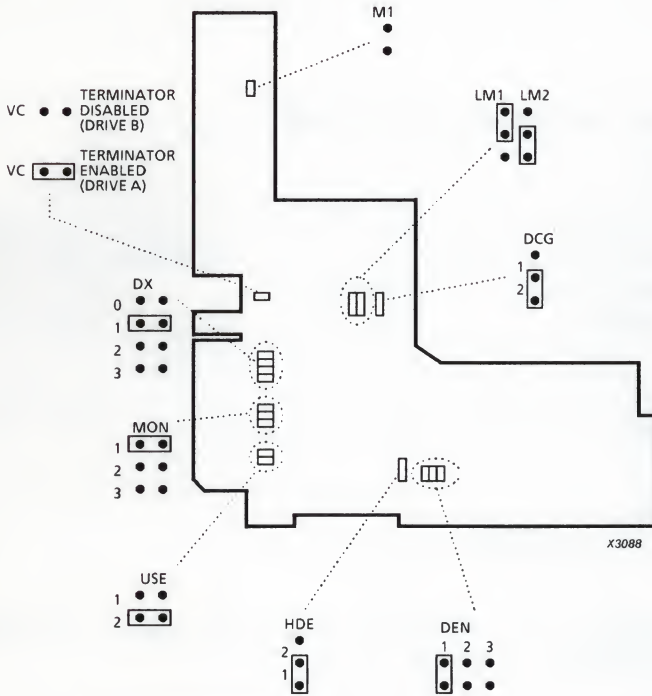
PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

### Interface Connector P2

GROUND RETURN	SIGNAL PIN	SIGNAL NAME	I/O
1	2	HIGH / NORMAL DENSITY	I
3	4	HEAD LOAD/IN USE-N	I
5	6	DRIVE SELECT 3-N	I
7	8	INDEX-N	O
9	10	DRIVE SELECT 0-N	I
11	12	DRIVE SELECT 1-N	I
13	14	DRIVE SELECT 2-N	I
15	16	MOTOR ON-N	I
17	18	DIRECTION-N	I
19	20	STEP-N	I
21	22	WRITE DATA-N	I
23	24	WRITE GATE-N	I
25	26	TRACK 00-N	O
27	28	WRITE PROTECT-N	O
29	30	READ DATA-N	O
31	32	SIDE SELECT-N	I
33	34	DISK CHANGE/READY	O

### 17.11.3. Strap Settings / Adjustments NEC 1157C

Strap locations 1157C



DEFAULT SETTING SHOWN

#### 17.11.4. Modification History NEC 1157C

SI-NR	SUBJECT
P3200-032	Strapsetting of the P3403-001 (NEC FD1157C) floppy disk drive in the P3200.

#### 17.11.5. Installation / Maintenance NEC 1157C

##### **P3200 / P3202:**

In the space above the drive release the slide fastener (P3200 model 1), or unscrew the two screws (P3200 model 2 / P3202). Shift the drive forward, note the orientation of power cable and the ribbon cable attached, and separate them from the drive. Pull the drive out of the system and set it aside. For the P3200 model 1 an additional mounting plate (P3209-013) is required.

##### **P3204:**

The drive is secured by two screws on each side of the drive. The left side screws might be hidden by the possible presence of the hard disk assembly.

##### **P3302:**

- Disconnect the cables
- Remove the two screws at the front
- Shift the drive out towards the front

To install the drive, reverse this procedure. Make certain that the edges of its mounting plate enter the rail on both sides of the frame.

If the drive is used as drive "A:" a terminator block must be present.

**NOTE:** *The upgrade kits have different mounting hardware, and therefore different order numbers.*



## **17.12. PANASONIC JU-475-2**

### **17.12.1. Characteristics Panasonic JU-475-2**

The Panasonic JU-475-2 is a 5.25" half height Double Sided/High Density 1.2MB floppy disk drive. The JU-475-2 can operate in either the high density mode or in the normal density mode. The normal density mode is used to read double density formatted (360KB) media. Selection of the density mode is done automatically by firmware when the formatted medium is loaded.

#### **WARNING:**

Only high density medium (S/FD 19, 96TPI) may be written by this drive. If a double density medium (S/FD 10, 48TPI) is written by this drive, reading on a double density drive is not guaranteed.

## 17.12.2. Connections Panasonic JU-475-2

### Power Connector P1

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

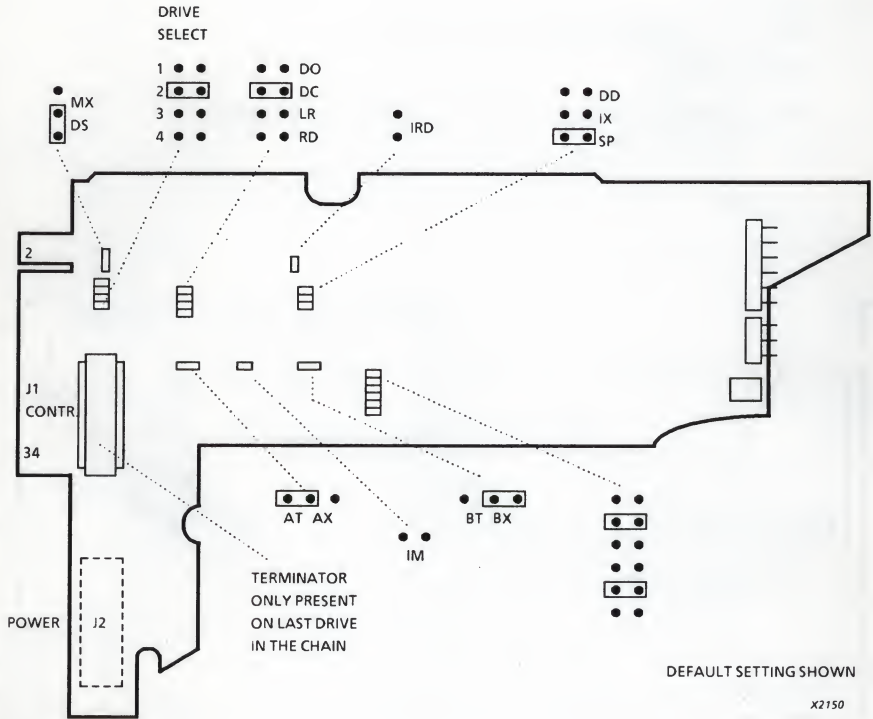
### Interface Connector P2

GROUND RETURN	SIGNAL PIN	SIGNAL NAME	I/O
1	2	HIGH / NORMAL DENSITY	I
3	4	HEAD LOAD/IN USE-N	I
5	6	DRIVE SELECT 3-N	I
7	8	INDEX-N	O
9	10	DRIVE SELECT 0-N	I
11	12	DRIVE SELECT 1-N	I
13	14	DRIVE SELECT 2-N	I
15	16	MOTOR ON-N	I
17	18	DIRECTION-N	I
19	20	STEP-N	I
21	22	WRITE DATA-N	I
23	24	WRITE GATE-N	I
25	26	TRACK 00-N	O
27	28	WRITE PROTECT-N	O
29	30	READ DATA-N	O
31	32	SIDE SELECT-N	I
33	34	DISK CHANGE/READY	O

### 17.12.3. Strap Settings / Adjustments Panasonic JU-475-2

The drive should always be strapped as drive 2. If the drive is used as drive "A", a terminator block must be present.

#### Strap Locations Panasonic JU-475-2



## 17.12.5. Installation / Maintenance Panasonic JU-475-2

### P3301:

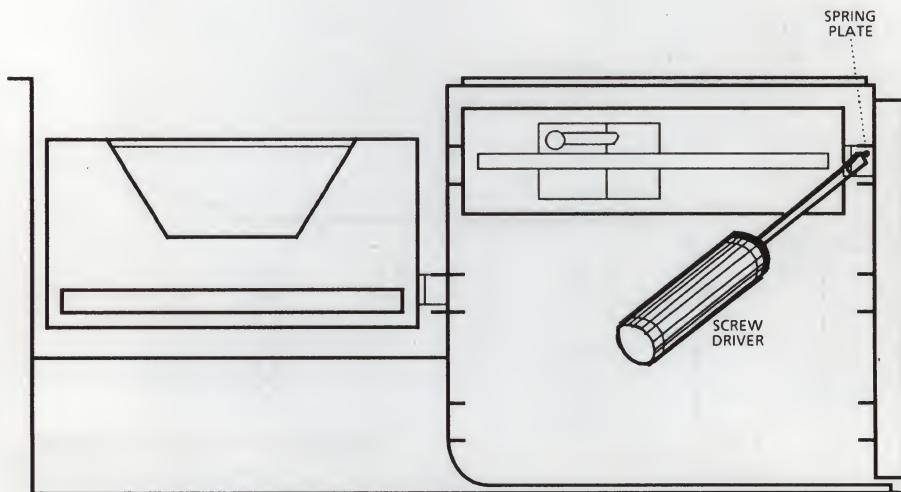
#### Removal:

- Disconnect the interface- and power cable of the drive.
- Put a screwdriver between the springplate and the housing.
- Slide the drive forward.

#### Replacement:

- Slide the drive backward until the springplate snaps.
- Connect the cables.

If the drive is used as drive "A:" a terminator block must be present.



X2147





system series: P3000

model: All

main assy:

nr: P3000-152

date: 30-8-1989 revised:21-09-89

title: Introduction of Panasonic JU-475-3A23, 1,2MB, 5,25" FDD.

note: This drive is replacing the NEC 1157C in the P3000 series range, and in the applicable upgrade kit P3209-065.

When production stocks of the NEC 1157C drive have been exhausted, it will be replaced by the Panasonic JU-475-3 FDD, which is electronically completely compatible, in the P3200 and P3300 systems. This is the 96 tpi version of the JU-455 already in use.

In single floppy drive systems, a NEC drive can be replaced by the Panasonic drive, but in dual drive systems, the NEC drive should only be replaced by another NEC, for reasons of appearance, as a mixed system has one disk load lever on the left hand side, and one on the right. For this reason (and for P4000/6000/9000 systems, which also use this drive), stocks of NEC 1157C drives will continue to be available from Concern Service.

The service 12NC of the drives are:

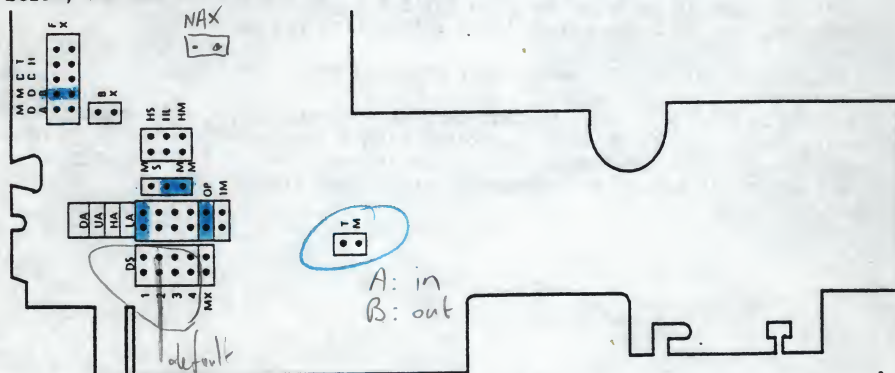
JU 475-~~11~~3A23  
NEC 1157C

5322 218 80702  
5322 693 21948

For the P3301 (ACER) system, the earlier revision of the drive, the Panasonic JU 475-2-GJ, was used. This drive, with service 12NC of 5322 693 21965, will be replaced by the JU 475-3A23 when stocks are exhausted.

Defective JU-475-3 drives should be retained in the workshops and used as a source of spares, as drive assemblies will not be available from CS.

There are a number of switch options, with locations as shown on the diagram below, and detailed on the next page.



Responsibility: C. Keatinge

Chris Keatinge

revised:

nr: P3000-152

Jumper	Description (with jumper in)	Jumper Status
DS1-4	Drive selection	DS2
MX	Constant drive selection used in single drive systems only	out
UA	Activity LED controlled by IN USE	out
DA	Activity LED controlled by DRIVE SELECT	in
LA	Activity LED controlled by latched function of IN USE	out
HA	Activity LED controlled by DRIVE SELECT and IN USE	out
MS	Drive motor enabled by DRIVE SELECT	out
MM	Drive motor enabled by MOTOR ON	in
HL	Head load from IN USE and DRIVE SELECT	out
HS	Head load from DRIVE SELECT	out
HM	Head load from MOTOR ON	out
OP	Dual mode (700kB and 1.2MB)	in
BX	Dual speed	out
1M	Single mode (700kB only)	out
TM	Termination resistor enable	in
	Drive A	out
	Drive B	out
EX	Disable true ready(index)	out
TH	DISK CHANGE/READY (Pin 34) not gated by DRIVE SELECT	out
DD	Unused	out
MDA	Determines function of pin 34	cut
MDB	Determines function of pin 34	in

Notes:

1. Only one of the jumpers DS1-4 must be present.
2. The last drive only has terminator jumper TM
3. The jumpers are grouped as follows:
  - (a) UA, DA, LA, HA control the activity LED
  - (b) MS, MM control the motor
  - (c) HL, HS, HM control the head load (but are not usable)
  - (d) OP, BX, 1M select high or normal density floppies
  - (e) TH, MDA, MDB are solder links and control pin 34

For groups (a) and (b) above, only one link should be present

The links are selected for the high density mode only, i.e. 360 rev/min, high density (i.e. high coercivity) floppies, with a formatted capacity of 1.2MB only, transfer rate of 500kbits/s. Pin 34 (signal READY/DISK CHANGE/MEDIA IN/MEDIA OUT) is set to DISK CHANGE by the solder links.



## 1.2MB DISK DRIVE UPGRADE KIT (P3209-065)

This upgrade kit includes the following:

JU-475-3Axx

- 1.2MB flexible disk drive
- a pair of sliding rails (used in P3103 and 3300 series systems)
- one power cable adapter (Figure 3)
- one data ribbon cable adapter (Figure 4)
- four machine screws with lockwashers.

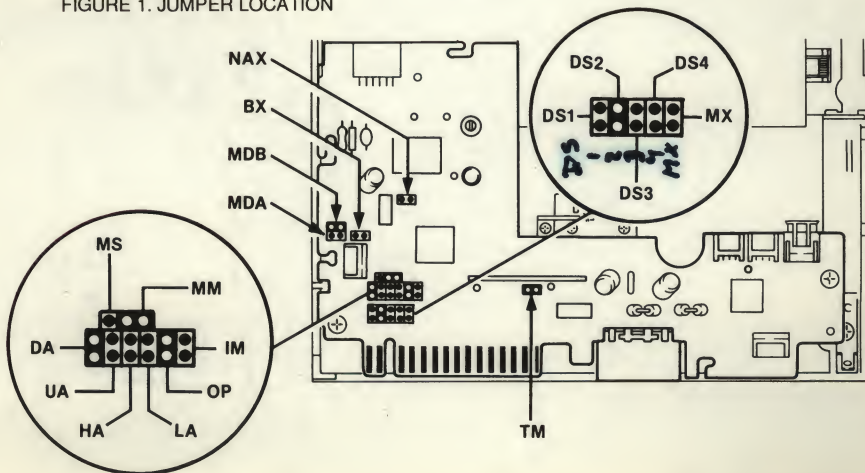
This drive is to be installed as drive B, the lower drive. Before installing your flexible disk drive, be sure the jumper settings correspond to the following table and to Figure 1.

TABLE 1. PANASONIC JU-475-3AGJ JUMPER SETTINGS

Jumper Name	Setting	Jumper Name	Setting
MDB	IN	OP	IN
MDA	OUT	1M	OUT
BX	OUT	DS 1	OUT
MS	OUT	DS 2	IN
MM	IN	DS 3	OUT
DA	IN	DS 4	OUT
UA	OUT	MX	OUT
HA	OUT	NAX	OUT
LA	OUT	TM	IN

OUT means the shunt (the small plastic cap) is removed, and the jumper pins are exposed.

FIGURE 1. JUMPER LOCATION



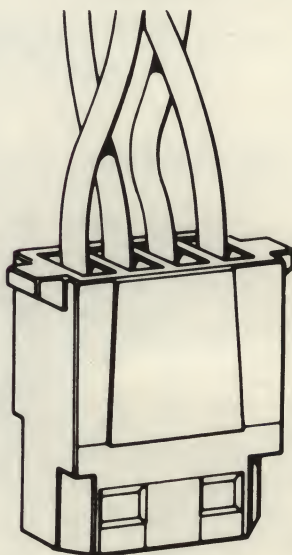
xxAE-2FY-WC

The main procedure for installing the new drive is covered in the documentation that came with your system. This installation involves the cable connections only.

- 1 Check to see which type of disk drive power connector your PC has (Figure 2).
- 2 If your PC has the large power connector, discard the small power cable adapter (Figure 3) that came with your upgrade kit.

If your PC has the small power connector, connect the small power cable adapter (Figure 3) to this small connector. Make sure the colour codes of both the cables match.

FIGURE 2. DISK DRIVE POWER CONNECTORS





## TECHNICAL TIP

=====

Title: Introduction of Panasonic JU-475-4A23 (beige)  
and JU-475-4A27 (grey)

SInr: P3000-219

System series: P3000

Model :

Main:	Code:	Service:	Serialnr:
Assy	nr.	12NC	affected
A. Fl. D 3A23, 1.2M 5 1/4"	5107 029 04260	5322 218 80702	All (beige)
A. Fl. D 4A23, 1.2M 5 1/4"	5107 029 05190	5322 218 80702	All (beige)
B. Fl. D 3A27, 1.2M 5 1/4"	5107 029 04010	5322 693 22829	All (grey)
B. Fl. D 4A27, 1.2M 5 1/4"	5107 029 05180	5322 693 22892	All (grey)

Date: 20-07-1990

Revised:

Note: The drives JU-475-4A23 and 4A27 are replacing the JU-475-3A23  
and JU-475-3A27 drives.

=====

The Panasonic drive JU-475 level 3 has been changed in level 4.

Changes: Three ICs are integrated to one IC.

The length of the head cable is changed.

Other mechanical components are not changed.

Because of cabling changes, PCB's from MLC-3 and MLC-4 drives are not interchangeable.

(It is not possible to upgrade the drive to level 4).

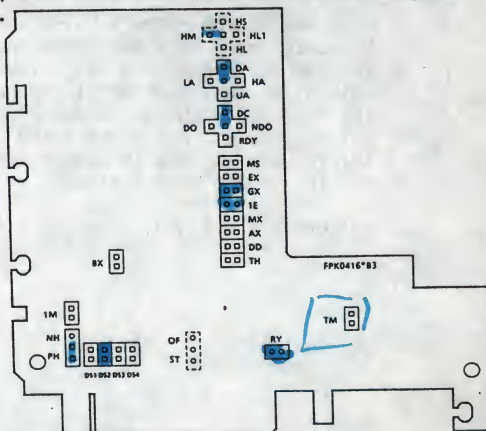
The specifications of the drive are not changed.

The service 12NCs of the drives are:

JU-475-4A23	same as JU-475-3A23	5322 218 80702
JU-475-4A27	same as JU-475-3A27	5322 693 22829

New strap settings:

There is a number of switch options, with locations as shown on the diagram  
below and detailed on the next page.



Responsibility: Leen Esselink





Revised:

SInr: P3000-219

Jumper	Description (with jumper in)	Jumper status
DS1-4	Drive selection	DS2
MX	Constant drive selection used in singel drive systems only	out
UA	Activity LED controlled by IN USE	out
DA	Activity LED controlled by DRIVE SELECT	in
LA	Activity LED controlled by latched function of IN USE	out
HA	Activity LED controlled by DRIVE SELECT and IN USE	out
MS	Drive motor enabled by DRIVE SELECT	out
HL	Head load from IN USE and DRIVE SELECT	out
HS	Head load from DRIVE SELECT	out
HM	Head load from MOTOR ON	in
HL1	Head load from latched function of IN USE	out
PH	Dual mode (positive High density)	in
NH	Dual mode (Negative High density)	out
BX	Dual speed	out
AX	Mode select from latched by DS	out
1M	Single mode (700KB only)	out
TM	Termination resistor enable	in
	Drive A	out
	Drive B	out
EX	Disable true ready (index)	out
RDY	Standard ready	out
DC	Disk change 1 (reset by STEP)	in
NDO	Disk IN	out
DO	Disk OUT	out
TH	DISK CHANGE/READY (Pin 34) not gated by DRIVE SELECT	out
DD	Unused	out
GX	Enable true ready (read data)	in
EX	Disenable true ready (index)	out
RY	Connect the drive status signal to pin #34 of J1	in
1E	Switch to 96TPI	in

## NOTES:

- Only one of the jumpers DS1-4 must be present.
- The last drive only has terminator jumper TM.
- The jumpers are grouped as follows:
  - UA, DA, LA, HA control the activity LED
  - MS control the motor
  - HL, HS, HM, HL1 control the head load (but are not usable)
  - PH, NH, AX, BX, 1M select high or normal density floppies
- RY, 1E, HM are solder links.

For group (A) above, only one link should be present.

## 17.13. EPSON SMD-440L/449L

### 17.13.1. Characteristics Epson SMD-440L/449L

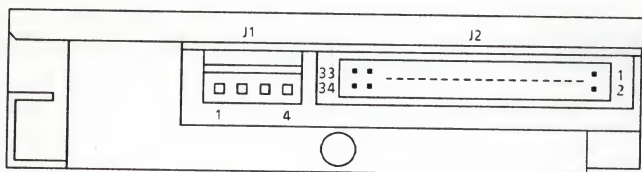
The Epson-440L/449L is a 3.5" double sided low profile (25.4 mm) floppy disk drive featuring a low noise mechanism and a reduced component count control PCB. The formatted capacity can be either 720 KB (Standard density) or 1440 KB (High Density).

This drive can be delivered with a  $3\frac{1}{2}$ " or  $5\frac{1}{4}$ " form factor chassis. With a  $3\frac{1}{2}$ " frame the drive is called Epson SMD 440L. With a  $5\frac{1}{4}$ " frame the drive is called Epson SMD 449L.

### 17.13.2. Connections Epson SMD-440L/449L

The Epson SMD-440L/449L has two connectors :

- J1 Power connector
- J2 Signal interface connector



Connector J1 :

PIN NUMBER	SIGNAL NAME
1	+ 5 VDC
2	GROUND
3	GROUND
4	N.C.

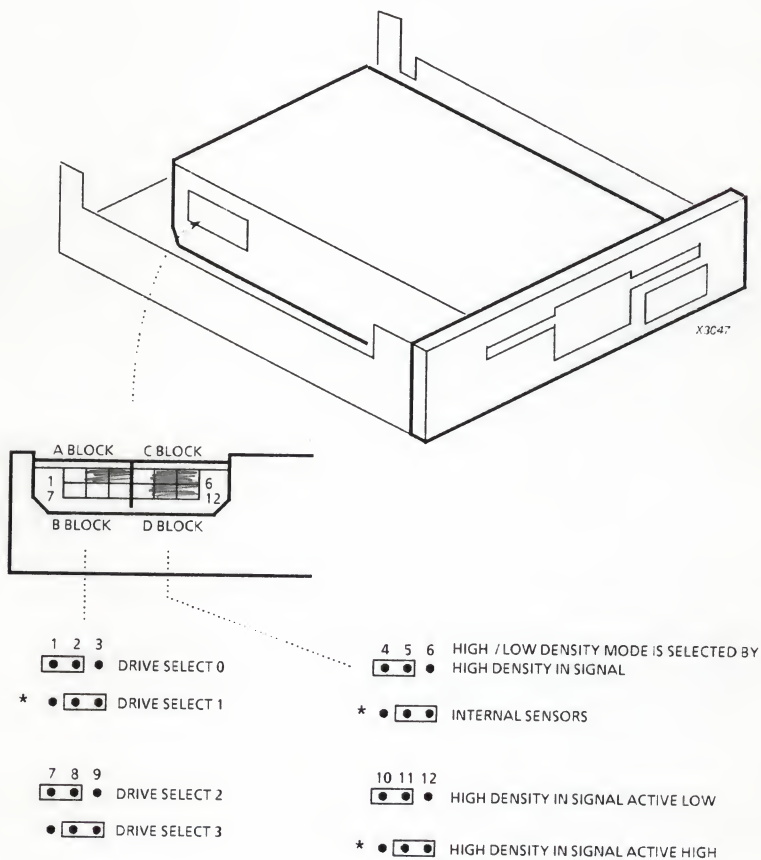
Connector J2 :

SIGNAL PIN	SIGNAL NAME	SIGNAL PIN	SIGNAL NAME
1	N.C.	2	HIGH DENSITY IN
3	N.C.	4	N.C.
5	N.C.	6	DRIVE SELECT 3-N
7	GROUND	8	INDEX-N
9	GROUND	10	DRIVE SELECT 0-N
11	GROUND	12	DRIVE SELECT 1-N
13	GROUND	14	DRIVE SELECT 2-N
15	GROUND	16	MOTOR ON-N
17	GROUND	18	DIRECTION-N
19	GROUND	20	STEP-N
21	GROUND	22	WRITE DATA-N
23	GROUND	24	WRITE GATE-N
25	GROUND	26	TRACK 0-N
27	GROUND	28	WRITE PROTECT-N
29	GROUND	30	READ DATA-N
31	GROUND	32	SIDE SELECT-N
33	GROUND	34	DISK CHANGE-N



### 17.13.3. Strap Settings / Adjustments Epson SMD-440L/449L

**NOTE:** The drive should always be strapped as drive 1.



\* DEFAULT

### 17.13.5. Installation / Maintenance Epson SMD-440L/449L

#### P3302 / P9130 / P9160:

- Disconnect the cables
- Remove the two screws at the front
- Shift the drive out towards the front
- Remove the four screws at the bottom so that the drive can be removed from the floppy mounting bracket.

## 17.14. EPSON SMD-480L/489L

770

### 17.14.1. Characteristics Epson SMD-480L/489L

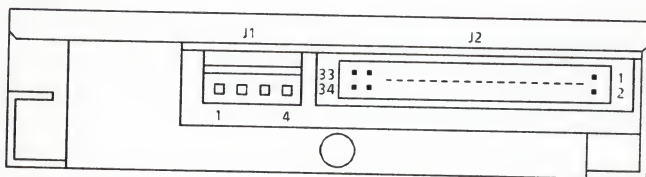
The Epson-480L/489L is a 3.5" double sided low profile (25.4 mm) floppy disk drive featuring a low noise mechanism and a reduced component count control PCB. The formatted capacity is 720 KB (Standard density).

The Epson SMD-480L/489L can be delivered with  $3\frac{1}{2}$ " or  $5\frac{1}{4}$ " form factor chassis. With a  $3\frac{1}{2}$ " frame the drive is called Epson SMD-480L. With a  $5\frac{1}{4}$ " frame the drive is called Epson SMD-489L.

### 17.14.2. Connections Epson SMD-480L/489L

The Epson SMD-480L/489L has two connectors :

- J1 Power connector
- J2 Signal interface connector



REAR VIEW

X3046

Connector J1 :

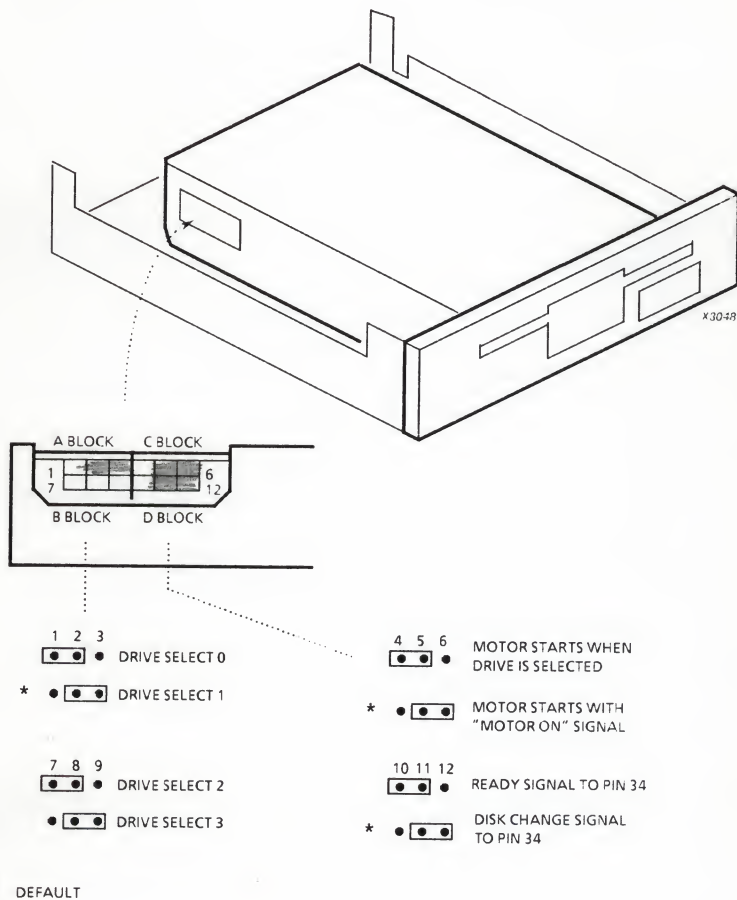
PIN NUMBER	SIGNAL NAME
1	+ 5 VDC
2	GROUND
3	GROUND
4	N.C.

Connector J2 :

SIGNAL PIN	SIGNAL NAME	SIGNAL PIN	SIGNAL NAME
1	N.C.	2	N.C.
3	N.C.	4	N.C.
5	N.C.	6	DRIVE SELECT 3-N
7	GROUND	8	INDEX-N
9	GROUND	10	DRIVE SELECT 0-N
11	GROUND	12	DRIVE SELECT 1-N
13	GROUND	14	DRIVE SELECT 2-N
15	GROUND	16	MOTOR ON-N
17	GROUND	18	DIRECTION-N
19	GROUND	20	STEP-N
21	GROUND	22	WRITE DATA-N
23	GROUND	24	WRITE GATE-N
25	GROUND	26	TRACK 0-N
27	GROUND	28	WRITE PROTECT-N
29	GROUND	30	READ DATA-N
31	GROUND	32	SIDE SELECT-N
33	GROUND	34	READY / DISK CHANGE-N

### 17.14.3. Strap Settings / Adjustments Epson SMD-480L/489L

**NOTE:** The drive should always be strapped as drive 1.



## 17.14.5. Installation / Maintenance Epson SMD-480L/489L

### P3302 / P9130 / P9160:

- Disconnect the cables
- Remove the two screws at the front
- Shift the drive out towards the front
- Remove the four screws at the bottom so that the drive can be removed from the floppy mounting bracket.



## **17.15. SONY MP-F11W**

### **17.15.1. Characteristics Sony MP-F11W**

The Sony MP-F11W is a 3.5" double sided low profile (25.4 mm) floppy disk drive. The formatted capacity is 720 KB (Standard density).

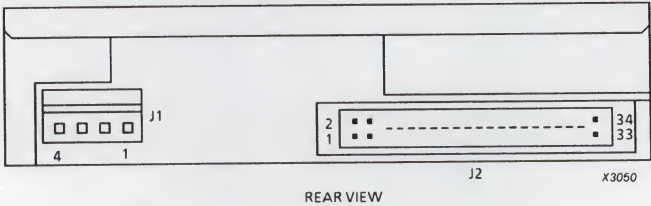
17.15.2. Connections Sony MP-F11W

Power Connector J1

PIN NUMBER	SIGNAL NAME
1	+5 VDC
2	GROUND
3	GROUND
4	N.C.

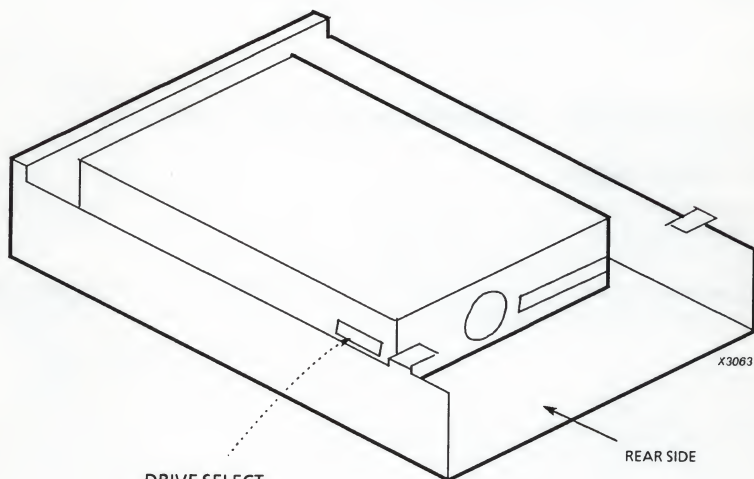
Interface Connector J2

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	N.C.
3	4	N.C.
5	6	DRIVE SELECT 3-N
7	8	INDEX-N
9	10	DRIVE SELECT 0-N
11	12	DRIVE SELECT 1-N
13	14	DRIVE SELECT 2-N
15	16	MOTOR ON-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	DISK CHANGE-N



### 17.15.3. Strap Settings / Adjustments Sony MP-F11W

**NOTE:** The drive should always be strapped as drive 1.



DRIVE SELECT



3 2 1 0

\*

\* DEFAULT

#### 17.15.4. Modification History Sony MP-F11W

SI-NR	SUBJECT
P3000-088	Maintenance documentation for EPSON and SONY 3.5" FDD's

#### 17.15.5. Installation / Maintenance Sony MP-F11W

##### P3302 / P9130 / P9160:

- Disconnect the cables
- Remove the two screws at the front
- Shift the drive out towards the front
- Remove the four screws at the bottom so that the drive can be removed from the floppy mounting bracket.

## **17.16. SONY MP-F17W**

### **17.16.1. Characteristics Sony MP-F17W**

The Sony MP-F17W is a 3.5" double sided low profile (25.4 mm) floppy disk drive. The formatted capacity can be either 720 KB (Standard density) or 1440 KB (High Density).

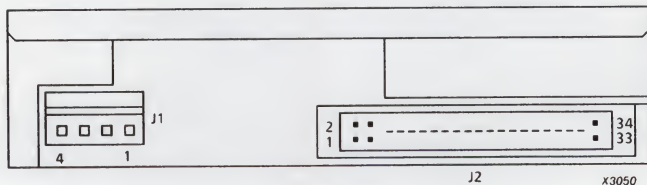
## 17.16.2. Connections Sony MP-F17W

### Power Connector J1

PIN NUMBER	SIGNAL NAME
1	+ 5 VDC
2	GROUND
3	GROUND
4	N.C.

### Interface Connector J2

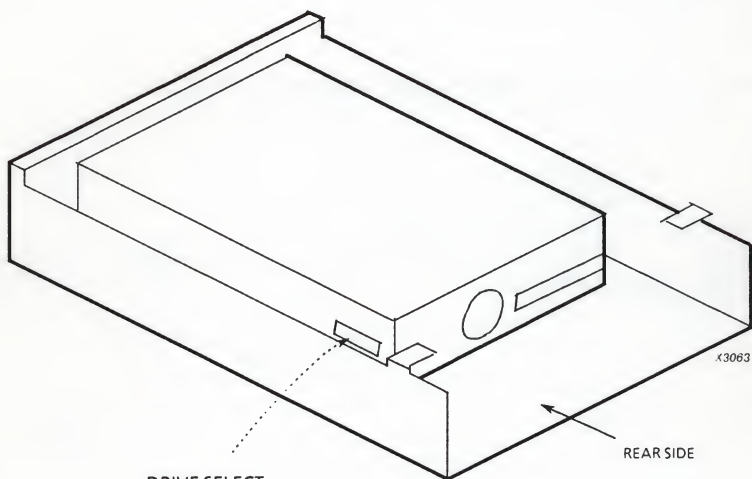
SIGNAL PIN	SIGNAL NAME	SIGNAL PIN	SIGNAL NAME
1	CHGRST	2	DISK CHANGE-N
3	GROUND	4	In-USE
5	GROUND	6	DRIVE SELECT 3-N
7	GROUND	8	INDEX-N
9	GROUND	10	DRIVE SELECT 0-N
11	GROUND	12	DRIVE SELECT 1-N
13	GROUND	14	DRIVE SELECT 2-N
15	GROUND	16	MOTOR ON-N
17	GROUND	18	DIRECTION-N
19	GROUND	20	STEP-N
21	GROUND	22	WRITE DATA-N
23	GROUND	24	WRITE GATE-N
25	GROUND	26	TRACK 0-N
27	GROUND	28	WRITE PROTECT-N
29	GROUND	30	READ DATA-N
31	GROUND	32	SIDE SELECT-N
33	GROUND	34	READY





### 17.16.3. Strap Settings / Adjustments Sony MP-F17W

**NOTE:** The drive should always be strapped as drive 1.



DRIVE SELECT



3 2 1 0

\*

\* DEFAULT

#### 17.16.4. Modification History Sony MP-F17W

SI-NR	SUBJECT
P3000-088	Maintenance documentation for EPSON and SONY 3.5" FDD's

#### 17.16.5. Installation / Maintenance Sony MP-F17W

##### P3302 / P9130 / P9160:

- Disconnect the cables
- Remove the two screws at the front
- Shift the drive out towards the front
- Remove the four screws at the bottom so that the drive can be removed from the floppy mounting bracket.

## 17.17. PANASONIC JU-475-3

1-2

### 17.17.1. Characteristics Panasonic JU-475-3

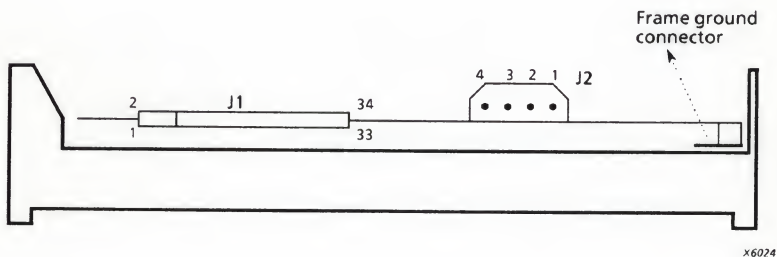
The Panasonic JU-475-3 is a 5 $\frac{1}{4}$ " half height, double sided, high density, 1.2MB (formatted) floppy disk drive. The JU-475-3 can operate in either the high density mode or in the normal density mode. The normal density mode is used to read double density formatted (360KB) media. Selection of the density mode is done automatically by firmware when the formatted medium is loaded.

Only high density medium (S/FD 19, 96TPI) may be written by this drive. If a double density medium (S/FD 10, 48TPI) is written by this drive, reading on a double density drive is not guaranteed.

### 17.17.2. Connections Panasonic JU-475-3

The JU-475-3 has three connectors :

- J1 Signal interface connector
- J2 Power connector
- Frame ground connector



Connector J2 :

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

Connector J1 :

GROUND RETURN	SIGNAL PIN	SIGNAL NAME	I/O
1	2	MODE SELECT	I
3	4	SPARE/IN USE-N	I
5	6	DRIVE SELECT 4-N	I
7	8	INDEX-N	O
9	10	DRIVE SELECT 1-N	I
11	12	DRIVE SELECT 2-N	I
13	14	DRIVE SELECT 3-N	I
15	16	MOTOR ON-N	I
17	18	DIRECTION SELECT-N	I
19	20	STEP-N	I
21	22	WRITE DATA-N	I
23	24	WRITE GATE-N	I
25	26	TRACK 0-N	O
27	28	WRITE PROTECT-N	O
29	30	READ DATA-N	O
31	32	SIDE SELECT-N	I
33	34	READY/DRIVE STATUS	O

Frame ground connector :

Frame ground is provided by a push on tab terminal, mounted on the rear of the drive right to the J2 connector.

### 17.17.3. Strap Settings / Adjustments Panasonic JU-475-3

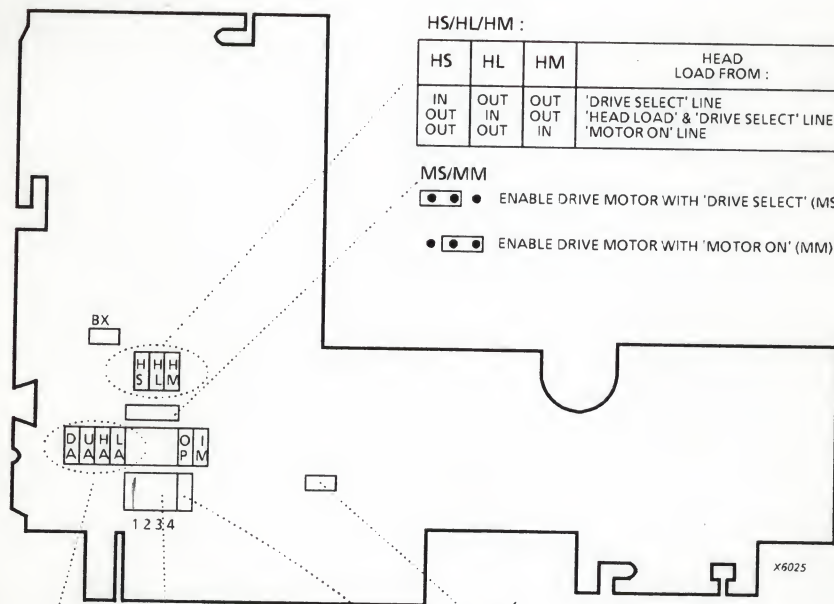
The drive should always be strapped as drive 2. If the drive is used as drive A:, the terminator strap (TM) must be present.

Strap locations of the Panasonic JU-475-3 :

OP	NAX	BX	IM	SPINDLE SPEED	DENSITY
OUT	OUT	OUT	OUT	360 RPM	HIGH
OUT	OUT	IN	OUT	360 RPM	HIGH
IN	IN	OUT	OUT	360 RPM	L - # 2
IN	IN	IN	OUT	L - # 2	L - # 2
IN	OUT	OUT	OUT	360 RPM	# 2
IN	OUT	IN	OUT	# 2	# 2
OUT	OUT	OUT	IN	360 RPM	LOW
OUT	OUT	IN	IN	360 RPM	LOW

L - # 2 : This is the latched value of Pin # 2 of the I/O interface.  
The latching operation occurs when the drive is selected from a deselected state.

# 2 : This is Pin # 2 of the I/O interface.



HS/HL/HM :

HS	HL	HM	HEAD LOAD FROM :
IN	OUT	OUT	'DRIVE SELECT' LINE
OUT	IN	IN	'HEAD LOAD' & 'DRIVE SELECT' LINE
OUT	OUT	IN	'MOTOR ON' LINE

MS/MM



• ENABLE DRIVE MOTOR WITH 'DRIVE SELECT' (MS) \*



• ENABLE DRIVE MOTOR WITH 'MOTOR ON' (MM)

D U H L  
A A A A  
• • • •

DRIVE SELECT :

DS1	DS2	DS3	DS4	DRIVE SELECTED
IN	OUT	OUT	OUT	1
OUT	IN	OUT	OUT	2
OUT	OUT	IN	OUT	3
OUT	OUT	OUT	IN	4



TERMINATOR RESISTOR ENABLED (DRIVE A:) \*



TERMINATOR RESISTOR DISABLED (DRIVE B:)

MX



• DRIVE IS SELECTED (SEE DRIVE SELECT) \*



• DRIVE ALWAYS SELECTED (ONLY USED IN SINGLE DRIVE SYSTEMS)

DA/UA/HA/LA :

DA	HA	UA	LA	ACTIVITY LED CONTROLLED BY :
IN	OUT	OUT	OUT	'DRIVE SELECT' LINE
OUT	IN	OUT	OUT	'DRIVE SELECT' & 'IN USE' LINE
OUT	OUT	IN	OUT	'IN USE' LINE
OUT	OUT	OUT	IN	LATCHED FUNCTION OF 'IN USE' LINE

\* = Default



### 17.17.5. Installation / Maintenance Panasonic JU-475-3

Before installation check the strap settings. Refer to sub-section 17.17.3. for strap settings. Connect the cables to the right connectors. The signal interface cable to connector J1 and the power cable to connector J2. Also connect the frame ground to the drive if available.

## 17.18. PANASONIC JU-475-4

### 17.18.1. Characteristics Panasonic JU-475-4

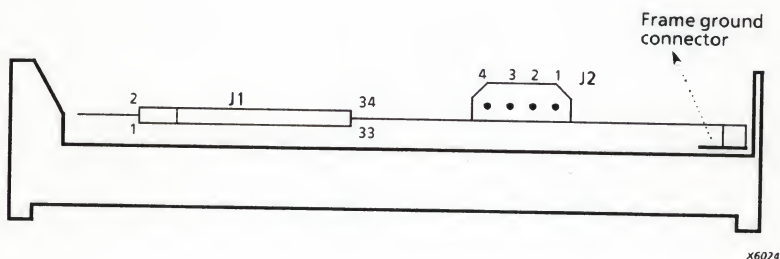
The Panasonic JU-475-4 is a 5¼" half height, double sided, high density, 1.2MB (formatted) floppy disk drive. The JU-475-4 can operate in either the high density mode or in the normal density mode. The normal density mode is used to read double density formatted (360KB) media. Selection of the density mode is done automatically by firmware when the formatted medium is loaded.

Only high density medium (S/FD 19, 96TPI) may be written by this drive. If a double density medium (S/FD 10, 48TPI) is written by this drive, reading on a double density drive is not guaranteed.

### 17.18.2. Connections Panasonic JU-475-4

The JU-475-4 has three connectors :

- J1 Signal interface connector
- J2 Power connector
- Frame ground connector



Connector J2 :

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

Connector J1 :

GROUND RETURN	SIGNAL PIN	SIGNAL NAME	I/O
1	2	MODE SELECT	I
3	4	SPARE IN USE-N	I
5	6	DRIVE SELECT 4-N	I
7	8	INDEX-N	O
9	10	DRIVE SELECT 1-N	I
11	12	DRIVE SELECT 2-N	I
13	14	DRIVE SELECT 3-N	I
15	16	MOTOR ON-N	I
17	18	DIRECTION SELECT-N	I
19	20	STEP-N	I
21	22	WRITE DATA-N	I
23	24	WRITE GATE-N	I
25	26	TRACK 0-N	O
27	28	WRITE PROTECT-N	O
29	30	READ DATA-N	O
31	32	SIDE SELECT-N	I
33	34	READY DRIVE STATUS	O

Frame ground connector :

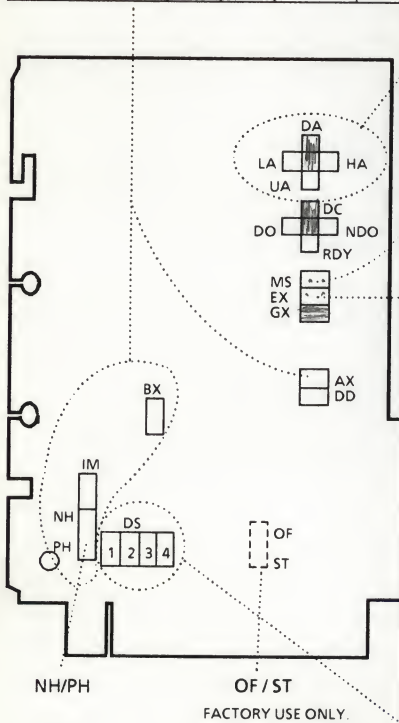
Frame ground is provided by a push on tab terminal, mounted on the rear of the drive right to the J2 connector.

### 17.18.3. Strap Settings / Adjustme

The drive should always be strapped as d

Strap locations of the Panasonic JU-475-4

PH	NH	AX	BX	IM	SPINDLE SPEED	DENS
OUT	OUT	OUT	OUT	OUT	360 RPM	HIGH
OUT	OUT	OUT	IN	OUT	360 RPM	HIGH
IN	OUT	IN	OUT	OUT	360 RPM	L - # 2
IN	OUT	IN	IN	OUT	L - # 2	L - # 2
IN	OUT	OUT	OUT	OUT	360 RPM	# 2
IN	OUT	OUT	IN	OUT	# 2	# 2
OUT	OUT	OUT	OUT	IN	360 RPM	NORM
OUT	OUT	OUT	IN	IN	300 RPM	NORM
OUT	IN	IN	OUT	OUT	360 RPM	L - # 3
OUT	IN	IN	IN	OUT	L - # 3	L - # 3
OUT	IN	OUT	OUT	OUT	360 RPM	# 3
OUT	IN	OUT	IN	OUT	# 3	# 3



NH/PH

OF / ST

FACTORY USE ONLY.



DUAL MODE (NEGATIVE HIGH DENSITY)



DUAL MODE (POSITIVE HIGH DENSITY) \*

\* = Default

#### FUNCTION

WHEN THE MEDIA IS INSERTED, MOTOR UP TO SPEED.

BY 'DRIVE SELECT' WHEN A MEDIA IS NOT INSERTED. PIN  
THE FIRST 'DRIVE SELECT' SIGNAL AFTER CHANGING THE  
PINS PIN # 34 TO A HIGH LEVEL.

DURING POWER UP OR WHEN A MEDIA IS NOT  
THE LOGIC LEVEL. THE DRIVE HAS TO BE DESELECTED  
WHILE THE DOOR IS CLOSED AND DRIVE POWERED UP.

CTION OF MEDIA INSERT STATUS. IT IS ACTIVE LOW WHEN

CTION OF MEDIA INSERT STATUS. IT IS ACTIVE LOW WHEN  
TED.

OF 'WRITE GATE' AND 'DRIVE SELECT' SIGNALS.

OF 'WRITE GATE' AND 'DRIVE SELECT' SIGNALS, AND ALSO

### 17.18.5. Installation / Maintenance Panasonic JU-475-4

Before installation check the strap settings. Refer to sub-section 17.18.3. for strap settings. Connect the cables to the right connectors. The signal interface cable to connector J1 and the power cable to connector J2. Also connect the frame ground to the drive if available.



## 17.19. EPSON SMD 340/349

1.44

### 17.19.1. Characteristics Epson SMD 340/349

The Epson SMD 340/349 is a low cost  $3\frac{1}{2}$ " double sided, low profile floppy disk drive. The Epson SMD 340/349 can work with either normal (720KB) or high density (1.44MB) floppy disks. The drive has a sensor to detect normal or high density.

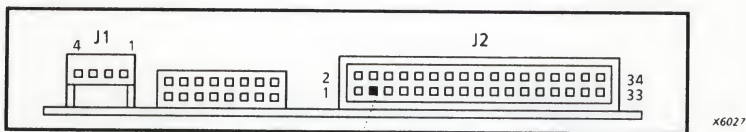
The Epson SMD 340/349 can be delivered with a  $3\frac{1}{2}$ " or  $5\frac{1}{4}$ " form factor chassis. With a  $3\frac{1}{2}$ " frame the drive is called Epson SMD 340. With a  $5\frac{1}{4}$ " frame the drive is called Epson SMD 349.

### 17.19.2. Connections Epson SMD 340/349

The Epson SMD 340/349 has two connectors :

- J1 Power cable connector
- J2 Signal interface connector

REAR VIEW



Pin 3 is removed to prevent incorrect insertion.

Connector J1 :

PIN NUMBER	SIGNAL NAME
1	+ 5 VDC
2	GROUND
3	GROUND
4	+ 12 VDC

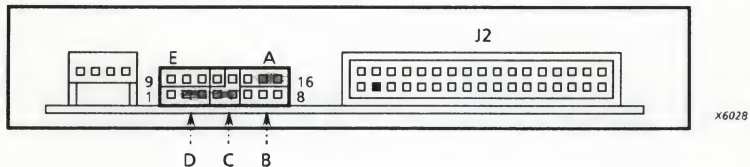
Connector J2 :

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	MODE SELECT
3	4	N.C.
5	6	DRIVE SELECT 3-N
7	8	INDEX-N
9	10	DRIVE SELECT 0-N
11	12	DRIVE SELECT 1-N
13	14	DRIVE SELECT 2-N
15	16	MOTOR ON-N
17	18	DIRECTION SELECT-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	DISK CHANGE-N

### 17.19.3. Strap Settings / Adjustments Epson SMD 340/349

The drive should always be strapped (strap 15-16) as drive 1.

REAR VIEW



- Block A :
- 14 15 16  
 ● [●] [●] DRIVE SELECT 1 \*
- [●] [●] ● DRIVE SELECT 0
- Block B :
- 6 7 8  
 ● [●] [●] DRIVE SELECT 3
- [●] [●] ● DRIVE SELECT 2
- Block C :
- 13  
 ● 1MB / 2MB from sensor \*
- 4 [●] [●] 5
- 13  
 1MB / 2MB from HDI input
- 4 ● [●] 5
- Block D :
- 1 2 3  
 ● [●] [●] 2MB mode set by HDI = LO \*
- [●] [●] ● 2MB mode set by HDI = HI
- Block E :
- 9 Ground  
 10, 11 Read data test points.
- Pin 12 : Factory used test point.

\* = default

### **17.19.5. Installation / Maintenance Epson SMD 340/349**

Before installation check the strap settings. Refer to sub-section 17.19.3. For strap settings. Connect the cables to the right connectors. The signal interface cable to connector J2 and the power cable to connector J1.

## 17.20. PANASONIC JU-257-3P

### 17.20.1. Characteristics Panasonic JU-257-3P

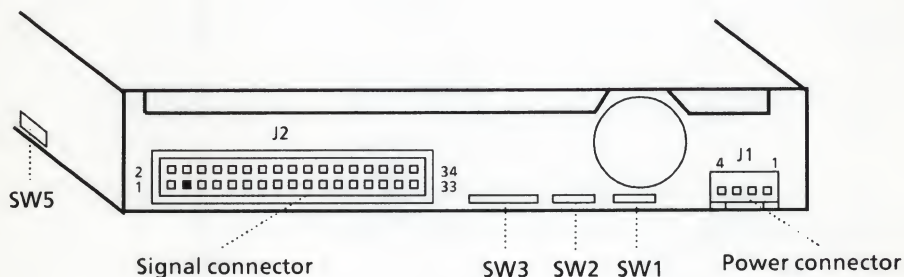
The Panasonic JU-257-3P is a low cost 3½" double sided, low profile floppy disk drive. The Panasonic JU-257-3P can work with either normal (720KB) or high density (1.44MB) floppy disks. The drive has a sensor to detect normal or high density.

### 17.20.2. Connections Panasonic JU-257-3P

The Panasonic JU-257-3P has two connectors :

- J1 Power cable connector
- J2 Signal interface connector

REAR VIEW





Connector J1 :

PIN NUMBER	SIGNAL NAME
1	+ 5 VDC
2	GROUND
3	GROUND
4	+ 12 VDC

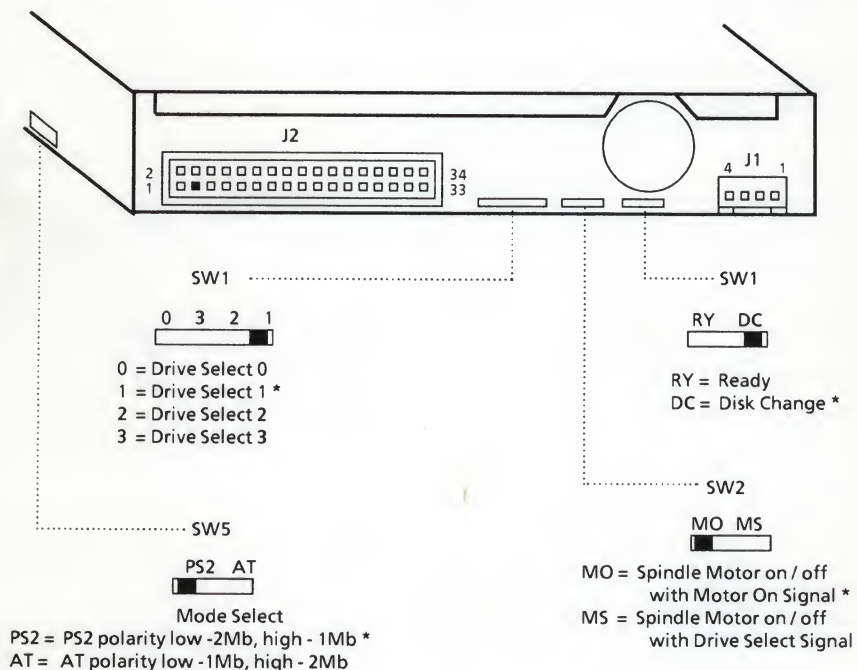
Connector J2 :

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	N.C.
3	4	N.C.
5	6	DRIVE SELECT 3-N
7	8	INDEX-N
9	10	DRIVE SELECT 0-N
11	12	DRIVE SELECT 1-N
13	14	DRIVE SELECT 2-N
15	16	MOTOR ON-N
17	18	DIRECTION SELECT-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	DISK CHANGE-N

### 17.20.3. Switch Settings Panasonic JU-257-3P

The drive should always be switched (SW1) as drive 1.

REAR VIEW



\* = DEFAULT

### **17.20.5. Installation / Maintenance Panasonic JU-457-3P**

Before installation check the strap settings. Refer to sub-section 17.20.3. For strap settings. Connect the cables to the right connectors. The signal interface cable to connector J2 and the power cable to connector J1.

## 17.21. TEAC FD235HF

### 17.21.1. Characteristics Teac FD235HF

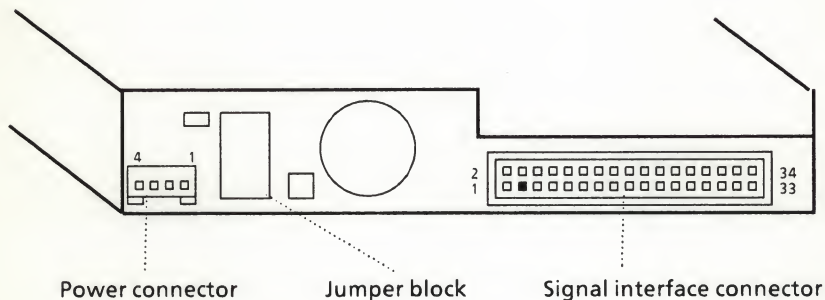
The is TEAC FD235HF a  $3\frac{1}{2}$ " high density floppy disk drive. The TEAC FD235HF can work with either normal (720KB) or high density (1.44MB) floppy disks. The drive has a sensor to detect normal or high density.

### 17.21.2. Connections Teac FD235HF

The TEAC FD235HF has two connectors :

- Power cable connector
- Signal interface connector

REAR VIEW



Power Connector :

PIN NUMBER	SIGNAL NAME
1	+ 5 VDC
2	GROUND
3	GROUND
4	+ 12 VDC

Signal interface connector :

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1*	2	MODE SELECT **
3	4	N.C.
5	6	DRIVE SELECT 4-N (not used)
7	8	INDEX-N
9	10	DRIVE SELECT 1-N
11	12	DRIVE SELECT 2-N (not used)
13	14	DRIVE SELECT 3-N (not used)
15	16	MOTOR ON-N
17	18	DIRECTION SELECT-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	DISK CHANGE-N or READY ***

\* All odd pins are used for ground return

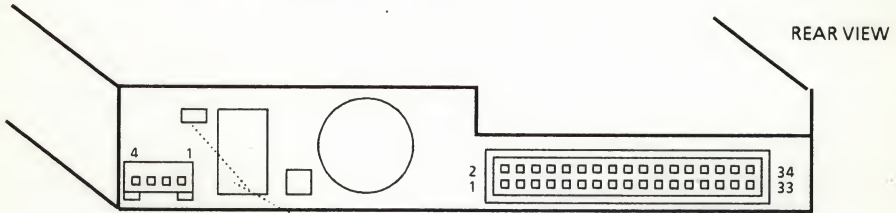
\*\* HD-IN, HD-OUT or DISK CHANGE (strap dependent)

\*\*\* Strap dependent

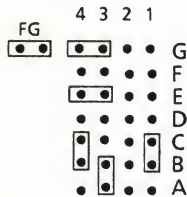


### 17.21.3. Strap Settings Teac FD235HF

The drive is always strapped as drive 1.(1B-1C)



Jumper block



\* = DEFAULT

JUMPER	FUNCTION
1A-1B	Drive is strapped as drive 0
1B-1C	Drive is strapped as drive 1 *
2A-2B	Drive is strapped as drive 2
2B-2C	Drive is strapped as drive 3
4A-4B	READY output on pin 34
4B-4C	DISK CHANGE output on pin 34 *
3C-4C	DISK CHANGE output on pin 2
4C-4D	DISK CHANGE output on pin 4
3A-3B	Density is set automatically *
3B-3C	Density is set by HD-IN on pin 2
3C-3D	HD-OUT output on pin 2
3D-4D	HD-OUT output on pin 4
1D-2D or 2D-2E	HD-IN invert; LOW = 2MB mode
1D-1E or 1E-2E	HD-OUT invert; LOW = HD disk
2E-2F	Half mask for INDEX/RD DATA
3F-3G	No mask for INDEX/RD DATA
1F-1G	LED ON when DRIVE SELECT + READY active
1G-2G	Motor on when MOTOR ON + LED ON active
4E-4F	Disable for 'auto-chucking' ( spindle motor rotates for 0.5 sec )
3G-4G	Enable for auto-recalibration *
3E-4E or 2E-3E	2MB / 1MB dual modes *
FG	FDD frame and 0Vdc ( logic ground ) interconnected *

### **17.21.5. Installation / Maintenance Teac FD235HF**

Before installation check the strap settings. Refer to sub-section 17.21.3. For strap settings. Connect the cables to the right connectors.

SPECIFICATION HARD DISK DRIVES	MINISCRIBE 8225XT	MINISCRIBE 8425	MINISCRIBE 8425XT	MINISCRIBE 8450AT
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes	20,42 20	20,42 20	20,42 20	40,72 40
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	805 - 2 26 System dep. Yes	615 - 4 17 System dep. Yes	615 - 4 17 System dep. Yes	745 - 4 28 1:1 Fixed Yes
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	Jumper J12 17 Sect. / tr.  615 4 17 3:1 Fixed Yes		Native  Not possible	Translate 17 Sect. / tr.   981 5 17 Fixed Yes
Positioner type Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Stepper Yes 820	Stepper Yes 663	Stepper Yes 640	Stepper Yes 820
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	15 68 155 8.33	15 68 152 8.33	15 68 150 8.33	12 40 90 8.33
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	898  2,7 RLL N / A N / A 3600 7.5	804 13412 MFM 128 615 3600 5	804 13412 2,7 RLL N / A N / A 3600 5	898  2,7 RLL N / A  3600 5
Start Time ( sec ) Stop Time ( sec )	15 15	15 15	15 15	15 15
Interface	IDE XT	ST412 / 506	IDE XT	IDE AT
POWER REQUIREMENTS +5V +12V +5V Start-Up +12V Start-Up	0.55 A typ 0.70 A typ 1.5 A max 2.0 A max	0.55 A typ 0.7 A typ 0.65 A max 2.0 A max	0.55 A typ 0.75 A typ 0.65 A max 2.0 A max	0.55 A typ 0.75 A typ 0.65 A max 2.4 A max
Form Factor Dimensions (mm) Weight (kg)	3.5" HH 102 x 150 x 41 0.8	3.5" HH 102 x 156 x 41 0.79	3.5" HH 102 x 154 x 41 0.79	3.5" HH 102 x 150 x 41 0.8
12 NC	5322 218 80567	5322 218 80288	5322 218 80358	5322 218 80696

\* See remark page 18.1-3

SPECIFICATION HARD DISK DRIVES	MINISCRIBE 6032	MINISCRIBE 6053	MINISCRIBE 6085	MINISCRIBE 8051A
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes	25.5 25	42.5 42	68 68	40.72 40
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	1024 - 3 17 System dep. Yes	1024 - 5 17 System dep. Yes	1024 - 8 17 System dep. Yes	745 - 4 28 1:1 Yes
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate* ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed				Translate    981 5 17 System dep. Yes
Positioner type Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Emb. Servo No 1028	Emb. Servo No	Emb. Servo No	Emb. Servo No
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	6 28 55 8.33	6 28 55 8.33	6 28 55 8.33	8 28 50 8.6
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	1000 9950 MFM 512 3600 5	1000 9950 MFM 512 3600 5	1000 9950 MFM 512 3600 5	1109 23202 2,7 RLL N / A N / A 3484 8
Start Time ( sec ) Stop Time ( sec )	20 10	20 10	20 10	15 15
Interface	ST412 / 506	ST412 / 506	ST412 / 506	IDE AT
POWER REQUIREMENTS + 5V + 12V + 5V Start-Up + 12V Start-Up	0.9 A typ 0.8 A typ 4.0 A max	0.9 A typ 0.8 A typ 4.0 A max	0.9 A typ 0.8 A typ 4.0 A max	0.45 A typ 0.45 A typ 1.5 A max
Form Factor Dimensions (mm) Weight (kg)	5.25" FH 146 × 203 × 83 2.7	5.25" FH 146 × 203 × 83 2.7	5.25" FH 146 × 203 × 83 2.7	3.5" HH 146 × 102 × 41 0.88
12 NC	5322 218 80184	5322 218 80334	5322 218 80335	5322 218 80686

\* See remark page 18.1-3



SPECIFICATION HARD DISK DRIVES	MICROPOLIS 1355	MICROPOLIS 1375	MICROPOLIS 1558-15	MICROPOLIS 1588 15
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes	140,0 -	142,9 -	322,7 -	643,1 -
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	Default values: 1024 - 8 35 Syst. dep. Yes	Def. values: 1024 8 8 36 Syst. dep Yes	Def. values: 1224 - 15 36 Syst. dep Yes	Def. values: 1632 6 15 54 Syst. dep Yes
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate * ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed				
Positioner type Stepper / Servo Surface /Emb Servo Head Park necessary ? Head landing cylinder	Servo Surface No ?	Servo Surface No ?	Servo Surface No ?	Servo Surface No ?
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	6 23 62 8.33	5 23 50 8.33	4 18 40 8.33	4 16 35 8.33
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	? ? 2,7 RLL N / A N / A 3600 10	? ? 2,7 RLL N / A N / A 3600 1.25MBytes/s	? ? 2,7 RLL N / A N / A 3600 10	? ? 2,7 RLL N / A N / A 3600 15
Start Time ( sec ) Stop Time ( sec )	12 20	12 20	12 20	12 20
Interface	ESDI	SCSI	ESDI	SCSI
POWER REQUIREMENTS + 5V + 12V + 5V Start-Up + 12V Start-Up	2.0 A typ 1.8 A typ 2.0 A max 4.35 A max	2.0 A typ 1.8 A typ 2.0 A max 4.35 A max	2.0 A typ 1.8 A typ 2.0 A max 4.35 A max	2.0 A typ 1.8 A typ 2.0 A max 4.35 A max
Form Factor Dimensions (mm) Weight (kg)	5.25" FH 203 x 147 x 86 2,7	5.25" FH 203 x 146 x 82 2,7	5.25" FH 203 x 147 x 82 3,4	5.25" FH 203 x 146 x 83 3,8
12 NC	5322 693 21957	5322 693 21989	5322 693 22071	5322 693 22873

\* See remark page 18.1-3



SPECIFICATION HARD DISK DRIVES	MICROPOLIS 1654-7	MICROPOLIS 1664 - 7	MICROPOLIS 1674 - 7	MICROPOLIS 1684 - 7
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes	153,7 -	328,5 -	153,3 -	328 -
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	Default values: 1249 - 7 36 Syst. dep. Yes	Def. values : 1780 - 7 54 Syst. dep Yes	Def. values : 1249 3 7 36 Syst. dep Yes	Def. values : 1780 3 7 54 Syst. dep Yes
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate * ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed				
Positioner type Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Servo Surfac No ?	Servo Surfac No ?	Servo Surfac No ?	Servo Surfac No ?
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	4 16 37 8.33	4 14 30 8.33	4 16 37 8.33	4 14 30 8.33
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	? ? 2,7 RLL N / A N / A 3600 10	? ? 2,7 RLL N / A N / A 3600 15	? ? 2,7 RLL N / A N / A 3600 4 MBytes/s	? ? 2,7 RLL N / A N / A 3600 4 MBytes/s
Start Time ( sec ) Stop Time ( sec )	12 20	12 20	12 20	12 20
Interface	ESDI	ESDI	SCSI	SCSI
POWER REQUIREMENTS + 5V + 12V + 5V Start-Up + 12V Start-Up	0,9 A typ 0,9 A typ 0,6 A max 2,0 A max	0,65 A typ 0,8 A typ 1,0 A max 2,5 A max	0,8 A typ 0,8 A typ 1,2 A max 2,5 A max	0,8 A typ 0,8 A typ 1,2 A max 2,5 A max
Form Factor Dimensions (mm) Weight (kg)	5.25" HH 203 × 147 × 41 2.27	5.25" HH 203 × 146 × 41 1.93	5.25" HH 203 × 146 × 41 2.27	5.25" HH 203 × 146 × 41 1.93
12 NC	5322 218 80705	5322 693 22622	5322 693 22869	5322 693 22871

\* see remark page 18.1-3

SPECIFICATION HARD DISK DRIVES	QUANTUM LPS105AT
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes	100,27 100
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	1219 - 4 Zone Bit Rec.  No
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate * ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	Translate    755 16 17  Yes, only data parts
Positioner type Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Voice coil, meander No ?
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	6 17 33 8.2
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	1330 29307 2,7 RLL N / A N / A 3662 4 MBytes/s
Start Time ( sec ) Stop Time ( sec )	8 10
Interface	IDE AT
POWER REQUIREMENTS + 5V + 12V + 5V Start-Up + 12V Start-Up	0.3 A typ 0.25 A typ 0.2 A 0.8 A max
Form Factor Dimensions (mm) Weight (kg)	3,5" 0,33H 146 x 102 x 25 0.9 A
12 NC	5322 693 22984

\* See remark page 18.1-3

SPECIFICATION HARD DISK DRIVES	RODIME R0352	RODIME 3055	RODIME 3057S	RODIME 3085S
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes	10,16 10	43,43 43	43,16 43	66,65 66
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	306 - 4 17 System dep. Yes	872 - 6 17 System dep. Yes	680 - 5 26 System dep. Yes	750 - 7 26 Yes
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate * ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed				
Positioner type Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Stepper ? ?	Servo Surface No Inner Diam.	Servo Surface No Inner Diam.	Servo Surface ? ?
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	18 85 180 8,38	7 28 62 8.3	7 28 50 8.73	7 28 60 8.73
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	600 11050 MFM 0 N / A 3580 5	1040 15072 MFM 650 3600 5	1040 18750 2,7 RLL N / A N / A 3433 937,5 KByt./s	1040 19950 2,7 RLL N / A N / A 3433 937,5 KByt./s
Start Time ( sec ) Stop Time ( sec )	12 15			
Interface	ST412 / 506	ST412 / 506	SCSI	SCSI
POWER REQUIREMENTS + 5V + 12V + 5V Start-Up + 12V Start-Up	0.53 A typ 0.9 A typ 0.6 A max 2.5 A max	0.4 A typ 0.6 A typ 2.3 A max	1.0 A 0.8 A typ 2.0 A	0.7 A typ 0.5 A typ 2.5 A
Form Factor Dimensions (mm) Weight (kg)	3.5" HH 146 x 102 x 41 1	3.5" HH 146 x 102 x 41 1	3.5" HH 157 x 101 x 41 1	3.5" HH 146 x 102 x 41 0,82
12 NC	5322 218 80163	5322 693 22061	5322 693 21997	5322 693 21998

\* See remark page 18.1-3

SPECIFICATION HARD DISK DRIVES	RODIME 3088A	RODIME 3128A
Formatted capacity (MB) Indicated in SETUP ( 1MB = 1024*1024 Bytes)	72,05 72	100,87 100
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	868 - 5 34 1:1 Yes,Data parts only	868 - 7 34 1:1 Yes,Data parts only
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate * ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	Native   User definable   No	Native   User definable   No
Positioner type: Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Servo Surface ? ?	Servo Surface ? ?
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	5 18 38 8,33	5 18 38 8,33
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	1380 23875 2,7 RLL N / A N / A 3600 1,25 MBytes/s	1380 23875 2,7 RLL N / A N / A 3600 1,25 MBytes/s
Start Time ( sec ) Stop Time ( sec )	12 30	12 30
Interface	IDE AT	IDE AT
POWER REQUIREMENTS + 5V + 12V + 5V Start-Up + 12V Start-Up	0.4 A typ 0.45 A typ 0.85 A typ 0.6 A max	0.4 A typ 0.45 A typ 0.85 A typ 0.6 A max
Form Factor Dimensions (mm) Weight (kg)	3,5" HH 146 × 102 × 41 0.8	3,5" HH 146 × 102 × 41 0.8
12 NC	5322 218 80701	5322 218 80699

\* See remark page 18.1-3



SPECIFICATION HARD DISK DRIVES	SEAGATE ST125A	SEAGATE ST157A	SEAGATE ST351 A/X	SEAGATE ST1144A
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes	20,42 20	40,55 40	40,67 40	124,64 124
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	404 - 4 26 System dep. Yes	539 - 6 26 System dep. Yes	Zone Bit Rec.  max 83640 No	Zone Bit Rec.  max 255255 No
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate * ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	Translate 17 sect./track  615 4 17 Yes, data parts only	Translate 17 sect./track  977 5 17 Yes, data parts only	Translate  980 5 17 Yes	Translate  1001 15 17 Yes
Positioner type Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Stepper No ?	Stepper No ?	Stepper No ?	Servo Surface No ?
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	8 28 70 8.33	8 28 70 8.33	7 28 65 9.84	6 18 38 8.5
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	824 16546 2,7 RLL N / A N / A 3600 7,5	824 20280 2,7 RLL N / A N / A 3600 7,5	1290 28992 2,7 RLL N / A N / A 3048 4 MBytes / s	1300 21600 2,7 RLL N / A N / A 3528 4 MBytes / s
Start Time ( sec ) Stop Time ( sec )	? ?	? ?	? ?	? ?
Interface	IDE AT	IDE AT	IDE AT / XT	IDE AT
POWER REQUIREMENTS +5V +12V +5V Start-Up +12V Start-Up	0,9 A typ 0.35 A typ 1,2 A max 2,0 A max	0,9 A typ 0.35 A typ 1,2 A max 2,0 A max	0.25 A typ 0.15 A typ 0,52 A max 1,0 A max	0.5 A typ 0.5 A typ 0,63 max 2.0 A max
Form Factor Dimensions (mm) Weight (kg)	3.5" HH 146 × 102 × 41 0.73	3.5" HH 146 × 102 × 41 0.73	3.5" HH 146 × 102 × 25 0.45	3.5" HH 146 × 205 × 44 0.77
12 NC	4822 212 60013	5322 218 80704	4822 693 91492	4822 693 91488

\* See remark page 18.1-3



SPECIFICATION HARD DISK DRIVES	SEAGATE ST1400	SEAGATE ST2383E 94246-383	SEAGATE ST2383N 92241-383
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes	331 -	322,44 -	315 -
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	1476 2 7 Zone Bit Rec. 1:1 Yes	Def. values: 1747 - 7 54 System dep. Yes	Def. values: 1261 2 7 Zone Bit Rec. 1:1 Yes
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate * ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed			
Positioner type Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Servo Surface No ?	Servo Surface No ?	Servo Surface No ?
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	2.5 14 26 6.8	3 16 33 8.35	3 14 24 8.33
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	1760 ? ? N / A N / A 4412 2,1 Mbytes/s	1459 31699 2,7 RLL N / A N / A 3592 15	1459 31674 1,7 RLL N / A N / A 3600 1-4,8 Mbytes/s
Start Time ( sec ) Stop Time ( sec )	<20 <30	<20 <20	<20 <25
Interface	SCSI	ESDI	SCSI
POWER REQUIREMENTS + 5V + 12V + 5V Start-Up + 12V Start-Up	0.5 A typ 0.5 A typ 0.9 A max 2,5 A max	0.75 A typ 0.85 A typ 1,0 A max 4,5 A max	0.65 A typ 1.0 A typ 0.75 A max 4,5 A max
Form Factor Dimensions (mm) Weight (kg)	3.5" FH 146 × 102 × 41 0.8	5,25" HH 146 × 205 × 41 1.81	5,25" HH 146 × 203 × 41 1.9
12 NC	4822 693 91526	5322 218 80878	4822 693 91496

\* See remark page 18.1-3

SPECIFICATION HARD DISK DRIVES	WEST. DIG. 93028 - XT	WEST. DIG. 93038 - XT	WEST. DIG. 93028 - A
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes	20,4 20	30,6 30	20,4 30
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	782 - 2 27 5:1 Yes	782 - 3 27 5:1 Yes	782 - 2 27 3:1 Yes
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate** ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	Translate, if no jumper on J8 1-2 17 sectors / track  615 4 17 3:1 Yes	Translate, if no jumper on J8 1-2 17 sectors / track  615 6 17 3:1 Yes	Translate, if no jumper on J8 1-2 17 sectors / track  615 4 17 3:1 Yes
Positioner type Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Stepper motor using micro steps Yes P862 / L 684 *	Stepper motor using micro steps Yes P862 / L 684*	Stepper motor using micro steps Yes P862 / L 684*
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	4,5 71 188 8,4	4,5 71 188 8,4	4,5 71 188 8,4
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	 2,7 RLL P 782 / L 616* P 782 / L 616* 3568 7.75	 2,7 RLL P 782 / L 616* P 782 / L 616* 3568 7.75	4.5  2,7 RLL N / A N / A 3568 7.5
Start Time ( sec ) Stop Time ( sec )	15 20	15 20	
Interface	IDE XT	IDE XT	IDE AT
POWER REQUIREMENTS + 5V + 12V + 5V Start-Up + 12V Start-Up	0,45 A typ 0,45 A typ 1,0 A max 2,0 A max	0,45 A typ 0,45 A typ 1,0 A max 2,0 A max	0,45 A max 0,45 A typ 1,0 A max 2,0 A max
Form Factor Dimensions (mm) Weight (kg)	3.5" HH 147 x 102 x 42 0.82	3.5" HH 147 x 102 x 42 0.82	3.5" HH 147 x 102 x 42 1
12 NC	5322 218 80556	5322 218 80698	5322 218 80568

\* P = Physical, L = Logical

\*\* See remark page 18.1-3

SPECIFICATION HARD DISK DRIVES	WEST. DIG. AC280	WEST. DIG. AC2200
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes		202,8 202
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed		Zone bit recording Max. nr. of available sectors = 415408
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate* ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed		Translate  User definable e.g.: 989 12 35 System dependent  Yes
Positioner type Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder		Emb. Servo No
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	6.0 18 28 8.34	5 14 24 8.34
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	1405 31591 3595   5	2400 43000 Zone bit recording N / A N / A 3652 5 MBytes/s
Start Time ( sec ) Stop Time ( sec )		5 6
Interface	IDE AT	IDE AT
POWER REQUIREMENTS + 5V + 12V + 5V Start-Up + 12V Start-Up	0,22 0,35  1.4 A	0,3 A typ 0,24 A typ 0,35A max 1.0A max
Form Factor Dimensions (mm) Weight (kg)	3.5" HH 102 x 146 x 25. 0.5	3.5" 0,33H 102 x 146 x 25 0,5
12 NC	4822 693 91551	4822 693 91537

\* See remark page 18.1-3





## 18.2. MINISCRIBE MS2012

### 18.2.1. Characteristics Miniscribe MS2012

The Miniscribe MS2012 is a 10 MB capacity full height Winchester Disk Drive.

### 18.2.2. Connections Miniscribe MS2012

The drive is interfaced to the system via four connectors.

Control Signal Connector J1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	REDUCED WRITE CURRENT
3	4	RESERVED
5	6	WRITE GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK 0-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 2'0-N
15	16	RESERVED
17	18	HEAD SELECT 2'1-N
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	DRIVE SELECT 3-N
31	32	DRIVE SELECT 4-N
33	34	DIRECTION IN-N



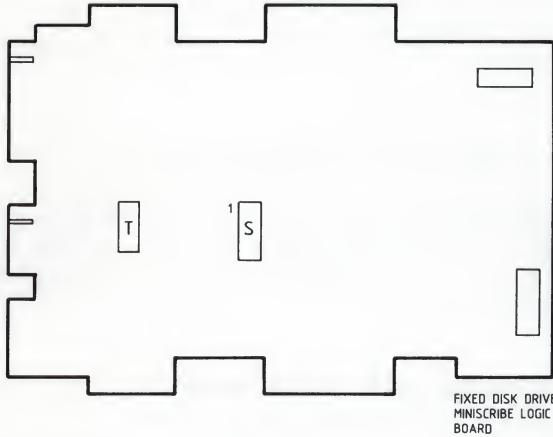
## Data Signal Connector J2

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SELECTED-N	2	GROUND
3	RESERVED	4	GROUND
5	N.C.	6	GROUND
7	RESERVED	8	GROUND
9	N.C.	10	N.C.
11	GROUND	12	GROUND
13	+ MFM WRITE DATA	14	-MFM WRITE DATA
15	GROUND	16	GROUND
17	+ MFM READ DATA	18	-MFM READ DATA
19	GROUND	20	GROUND

## Power Connector J3

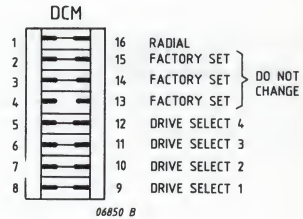
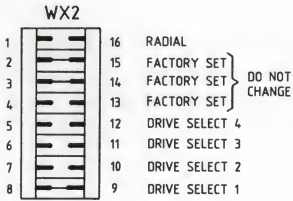
PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

### 18.2.3. Strap Settings / Adjustments Miniscribe MS2012



T = TERMINATOR  
(HAS TO BE INSTALLED)

S = SHUNT BLOCK



#### 18.2.4. Modification History Miniscribe MS2012

SI-NR	SUBJECT
P3100-003	Possible exchange from disk Seagate ST412 into Miniscribe 2012
P3100-007	Positioning of hard disk heads over the shipping-zone
P3100-022	Strap setting hard disk drives

#### 18.2.5. Installation / Maintenance Miniscribe MS2012

The drive should be mounted to the frame through the mechanically isolated mounting points on the bottom or sides of the drive using 6-32 machine screws, 1/4" maximum penetration. Adequate ventilation must be given to the drive to insure reliable operation over the operating temperature range.

#### 18.2.6. Diagnostic Functions Miniscribe MS2012

The MS2012 performs a power on selftest which checks disk rotation speed, microprocessor ROM sumcheck, track 000 sensor etc. If this check diagnoses an error the in-use LED on the front of the drive will blink, and the pattern off the blinking will indicate the fault.

Error codes are displayed in a "morse code" type manner. Bits may be interpreted and converted into hexadecimal error codes. "Zeros" are indicated by a short (0.1 second) ON mode. "Ones" are indicated by a short (0.6 second) ON mode. Error "Words" are separated by a 0.6 second LED off time.

Zero	= 0.1 S ON
One	= 0.6 S ON
Between Bits	= 0.6 S OFF
Between Repeat Cycles	= 2.0 S OFF

Listed below are the binary to hexadecimal conversion values:

0 = 0000	4 = 0100	8 = 1000	C = 1100
1 = 0001	5 = 0101	9 = 1001	D = 1101
2 = 0010	6 = 0110	A = 1010	E = 1110
3 = 0011	7 = 0111	B = 1011	F = 1111

Example: Code "E"

0.6 S ON  
0.6 S OFF  
0.6 S ON  
0.6 S OFF  
0.6 S ON  
0.6 S OFF  
0.1 S ON  
2.0 S OFF

## MESSAGE DEFINITIONS

Code 0 - Microprocessor RAM error  
Code 1 - EPROM checksum error  
Code 2 - Miscellaneous hardware error  
Code 3 - Write Fault does not set  
Code 4 - Write fault does not reset  
Code 5 - Unable to detect motor spinning  
Code 6 - Spin motor failed margin test  
Code 7 - Unable to maintain spin speed  
Code 8 - Unable to uncover Track Zero sensor  
Code 9 - Unable to cover Track Zero sensor  
Code A - Incorrect phase selected  
Code B - Step counter error  
Code C - Correct phasing is both pin pairs open  
Code D - Correct phasing is 3/14 open 4/13 shorted  
Code E - Correct phasing is 3/14 shorted 4/13 open  
Code F - Correct phasing is both pin pairs shorted





### 18.3. MINISCRIBE MS3012

#### 18.3.1. Characteristics Miniscribe MS3012

The Miniscribe MS3012 is a 10 MB capacity half height Winchester Disk Drive.

#### 18.3.2. Connections Miniscribe MS3012

The drive is interfaced to the system via four connectors.

Control Signal Connector P1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	RESERVED
3	4	RESERVED
5	6	WRITE GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK 0-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 2 <sup>0</sup> 0-N
15	16	RESERVED
17	18	RESERVED
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	DRIVE SELECT 3-N
31	32	DRIVE SELECT 4-N
33	34	DIRECTION IN-N

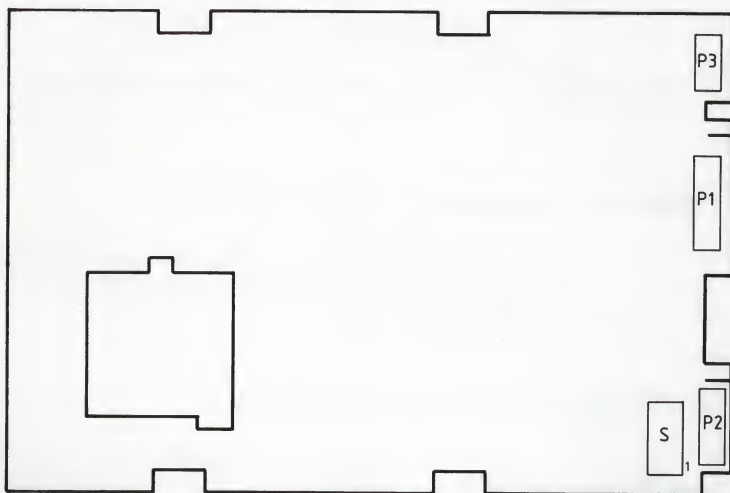
## Data Signal Connector P2

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SELECTED-N	2	GROUND
3	RESERVED	4	GROUND
5	N.C.	6	GROUND
7	RESERVED	8	GROUND
9	N.C.	10	N.C.
11	GROUND	12	GROUND
13	+ MFM WRITE DATA	14	-MFM WRITE DATA
15	GROUND	16	GROUND
17	+ MFM READ DATA	18	-MFM READ DATA
19	GROUND	20	GROUND

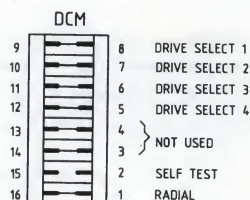
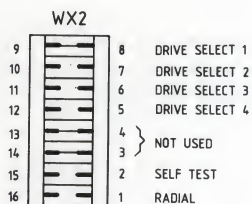
## Power Connector P3

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

### 18.3.3. Strap Settings / Adjustments Miniscribe MS3012



S = SHUNT BLOCK



06850 A

### 18.3.4. Modification History Miniscribe MS3012

SI-NR	SUBJECT
P3100-007	Positioning of hard disk heads over the shipping-zone
P3100-018	Replacement full-height to half-height hard disk drives
P3100-022	Strap setting hard disk drives

### 18.3.5. Installation / Maintenance Miniscribe MS3012

The drive should be mounted to the frame through using 6-32 machine screws, 1/4" maximum penetration. Adequate ventilation must be given to the drive to insure reliable operation over the operating temperature range.

### 18.3.6. Diagnostic functions Miniscribe MS3012

The MS3012 performs a power on selftest which checks disk rotation speed, microprocessor ROM sumcheck, track 000 sensor etc. If this check diagnoses an error the in-use LED on the front of the drive will blink, and the pattern off the blinking will indicate the fault.

Error codes are displayed in a "morse code" type manner. Bits may be interpreted and converted into hexadecimal error codes. "Zeros" are indicated by a short (0.1 second) ON mode. "Ones" are indicated by a short (0.6 second) ON mode. Error "Words" are separated by a 0.6 second LED off time.

Zero	= 0.1 S ON
One	= 0.6 S ON
Between Bits	= 0.6 S OFF
Between Repeat Cycles	= 2.0 S OFF

Listed below are the binary to hexadecimal conversion values:

0 = 0000	4 = 0100	8 = 1000	C = 1100
1 = 0001	5 = 0101	9 = 1001	D = 1101
2 = 0010	6 = 0110	A = 1010	E = 1110
3 = 0011	7 = 0111	B = 1011	F = 1111

Example: Code "E"

0.6 S ON  
0.6 S OFF  
0.6 S ON  
0.6 S OFF  
0.6 S ON  
0.6 S OFF  
0.1 S ON  
2.0 S OFF

## MESSAGE DEFINITIONS

Code 0 - Microprocessor RAM error  
Code 1 - EPROM checksum error  
Code 5 - Unable to detect motor spinning  
Code 6 - Spin motor failed margin test  
Code 7 - Unable to maintain spin speed  
Code 8 - Unable to uncover Track Zero sensor  
Code 9 - Unable to cover Track Zero sensor  
Code A - Interrupter Phase Error (factory phase adjust)





## 18.4. MINISCRIBE MS3212

### 18.4.1 Characteristics Miniscribe MS3212

The Miniscribe MS3212 is a 10 MB capacity half height Winchester Disk Drive.

The major advantages of the MS3212 over the previously used Miniscribe Hard Disk Drives is that the MS3212 offers shorter access times and lower power consumption.

### 18.4.2. Connections Miniscribe MS3212

The drive is interfaced to the system via four connectors.

Control Signal Connector P1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	RESERVED
3	4	RESERVED
5	6	WRITE GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK 0-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 2 <sup>0</sup> -N
15	16	RESERVED
17	18	RESERVED
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	DRIVE SELECT 3-N
31	32	DRIVE SELECT 4-N
33	34	DIRECTION IN-N

## Data Signal Connector P2

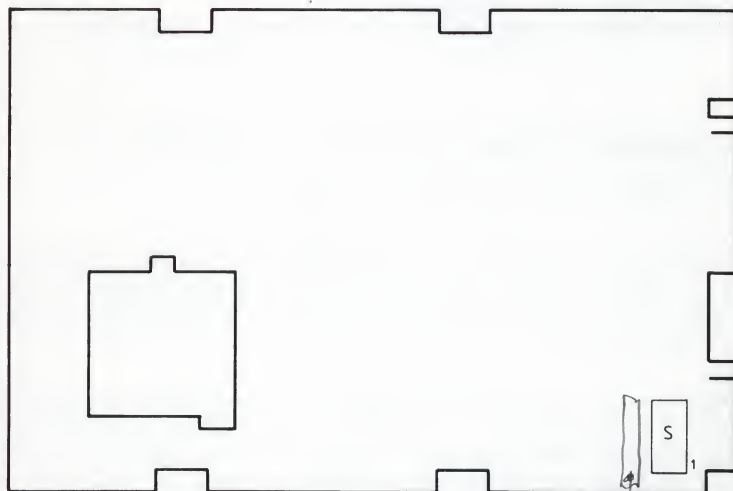
PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SELECTED-N	2	GROUND
3	RESERVED	4	GROUND
5	N.C.	6	GROUND
7	RESERVED	8	GROUND
9	N.C.	10	N.C.
11	GROUND	12	GROUND
13	+ MFM WRITE DATA	14	-MFM WRITE DATA
15	GROUND	16	GROUND
17	+ MFM READ DATA	18	-MFM READ DATA
19	GROUND	20	GROUND

## Power Connector P3

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

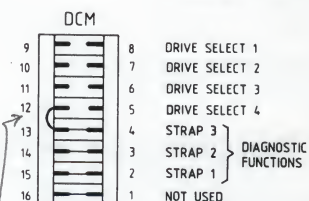
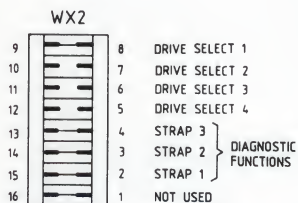
### 18.4.3. Strap Settings / Adjustments Miniscribe MS3212

The straps on the MS3212 perform two different functions, drive address selection and drive diagnostics.



S = SHUNT BLOCK

*Shunt line term.*



06851

*Force drive select  
S<sub>2</sub> P3120018*

#### 18.4.4. Modification History Miniscribe MS3212

SI-NR	SUBJECT
P3100-007	Positioning of hard disk heads over the shipping-zone
P3100-014	Introduction Miniscribe 3212 Hard Disk Drive
P3100-022	Strap setting hard disk drives

#### 18.4.5. Installation / Maintenance Miniscribe MS3212

The MS3212 is installed in place of the top flexible disk.

Firstly, before removing the drive from the system or moving the system complete, it is important to ensure that the read/write heads are moved to the shipping zone at cylinder 656. This is done by keying in the command "PARK" <RETURN> at the operating system prompt.

A Winchester technology Hard Disk Drive is very susceptible to shock, which may cause damage to the read/write heads or the media. When the drive is installed the sealed unit is mechanically isolated from the computer by mounting frame. Whenever the drive is removed from the computer it must be placed on a pad of soft foam (or similar) with the sealed unit uppermost.

When handling the drive only use the frame, never the sealed unit or the front bezel. To prevent damage to the drive if it is to be shipped it must be packaged in the original packing material or the equivalent.

#### 18.4.6. Diagnostic Functions Miniscribe MS3212

The MS3212 performs a power on selftest which checks disk rotation speed, microprocessor ROM sum check, track 000 sensor etc. If this check diagnoses an error the in-use LED on the front of the drive will blink, and the pattern of the blinking will indicate the fault.

Error codes are displayed in a "morse code" type manner. Bits may be interpreted and converted into hexadecimal error codes. "Zeros" are indicated by a short (0.5 second) flashing mode. "Ones" are indicated by a short (also a 0.5 second) continuous ON mode. Error "Words" are separated by a one second LED off time.



Zero	= 0.5 S flashing mode
One	= 0.5 S continuous ON mode
Between Bits	= 0.5 S off
Between Repeat Cycles	= 1.0 S off

Listed below are the binary to hexadecimal conversion values:

0 = 0000	4 = 0100	8 = 1000	C = 1100
1 = 0001	5 = 0101	9 = 1001	D = 1101
2 = 0010	6 = 0110	A = 1010	E = 1110
3 = 0011	7 = 0111	B = 1011	F = 1111

Example: Code "E"

0.5 S ON  
 0.5 S OFF  
 0.5 S ON  
 0.5 S OFF  
 0.5 S ON  
 0.5 S OFF  
 0.5 S FLASHING  
 1.0 S OFF

## MESSAGE DEFINITIONS

Code 0 - Microprocessor RAM error  
 Code 1 - Microprocessor ROM checksum error  
 Code 2 - Interface chip diagnostic failure  
 Code 3 - Write Fault Latch will not reset  
 Code 4 - Index pulse not detected during spin-up  
 Code 5 - Unable to reach 3600 rpm in 30 seconds  
 Code 6 - Unable to stabilize spin speed in 10 seconds  
 Code 7 - Unable to maintain spin speed to 0.5%  
 Code 8 - Unable to uncover Track Zero sensor  
 Code 9 - Unable to cover Track Zero sensor  
 Code A - Track Zero interrupter misadjusted  
 Code B - Shipping zone error, crash stop misadjusted  
 Code C - Carriage stuck during recall error  
 Code D - Seek error during burn-in or recall  
 Code E - Unused  
 Code F - Unexpected interrupt from the processor

The MS3212 will examine the strap settings after performing its power-on diagnostics checks, and if the straps are set for seek checks it will perform these checks until power is removed.

#### Diagnostic Strap settings

STRAP1	STRAP2	STRAP3	FUNCTION
ON	ON	X	Normal Operation (default setting)
ON	OFF	X	Factory Use Only
OFF	ON	OFF	Random Seek (Burn-In Mode)
OFF	ON	ON	Random Seek
OFF	OFF	OFF	Crescendo Seek (Burn-In Mode)
OFF	OFF	ON	Crescendo Seek

## 18.5. RODIME RO352

### 18.5.1. Characteristics Rodime RO352

The Rodime RO352 is a two-platter 10 Mbyte  $3\frac{1}{2}$ " hard disk drive. The drive is mounted internally within the chassis of the system unit, with the activity LED brought out to the front bezel. There is a second status LED mounted on the drive PCB itself, used to indicate drive power-on and to display drive status if a fault condition should occur.

### 18.5.2. Connections Rodime RO352

The drive is interfaced to the system via three connectors, responsible for drive control, data transmission and power. Frame grounding is provided by the chassis mounting.

Control Connector J1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	RESERVED
3	4	RESERVED
5	6	WRITE GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK ZERO-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 2 <sup>0</sup> 0-N
15	16	(TO J2-7)
17	18	HEAD SELECT 2 <sup>1</sup> 1-N
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	DRIVE SELECT 3-N
31	32	DRIVE SELECT 4-N
33	34	DIRECTION IN-N

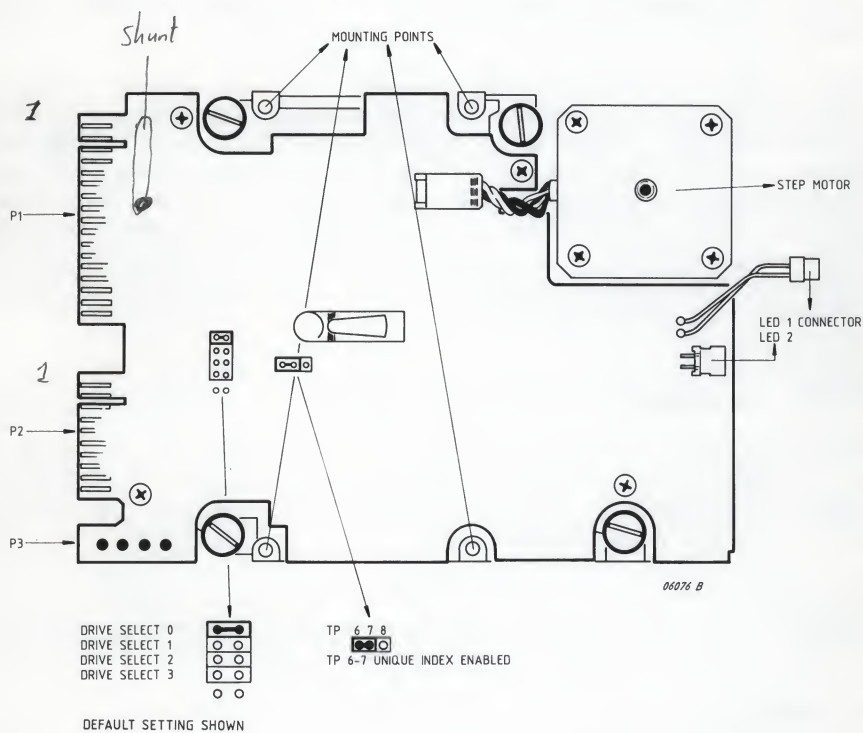
## Data Connector J2

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SELECTED-N	2	GROUND
3	RESERVED	4	GROUND
5	N.C.	6	GROUND
7	(TO J1-16)	8	GROUND
9	N.C.	10	GROUND
11	N.C.	12	GROUND
13	+ MFM WRITE DATA	14	- MFM WRITE DATA
15	GROUND	16	GROUND
17	+ MFM READ DATA	18	- MFM READ DATA
19	GROUND	20	GROUND

## Power Connector P3

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

### 18.5.3. Strap Settings / Adjustments Rodime RO352





### **18.5.5. Installation / Maintenance Rodime RO352**

To remove the drive, firstly remove the drive mounting plate securing screw on the front of the chassis. Supporting the drive with your hand, remove the two screws that secure the drive mounting plate to the central chassis member, and remove the connectors from the drive with the drive lowered slightly. Remove the drive and place it on a soft padded surface.

When installing an RO352, ensure that the drive is correctly strapped, and that the control and data cables are intended for the RO352, as some connectors are too big to fit in the limited space available on the small PCB of the RO352. Lower the drive with its mounting plate fitted into the chassis about half the way in and pass the led connector through the hole in the front panel of the chassis. Continue to lower the drive until it will go no further, then connect the data and control cables. Secure the drive with the three screws then connect the shortest power cable from the power supply to the drive. The drive activity LED is installed on the front mounting plate, next to the power LED, and connected to the LED1 connector.

### **18.5.6. Diagnostic Functions Rodime RO352**

The microprocessor on the RO352 performs a series of tests during power-up, and then monitors the drive during use. Should a fault condition be detected, the microprocessor indicates the fault type by flashing a code on the LED2 (refer to section 18.11.3.), and shuts down the spindle motor.

Fault codes are in the form of 4 bit binary numbers which are transmitted with the most significant bit first. The codes will be repeated until the drive power has been reset. A long flash represents a logical '1', and a short flash a logical '0'.

For example: short, short, long, short = 0010 = code 2.

During power-up the following fault codes may be indicated:

1, 2, 3, 5, 8, 9, 10 and 11.

During operation the following codes may be indicated:

4, 6 and 7.

## RO352 Fault Codes

Code 1	(0001):	No index track data burst.
Code 2	(0010):	No flag 00.
Code 3	(0011):	Motor speed outside +/- 1% tolerance at the end of power up.
Code 4	(0100):	Motor speed outside +/- 10% tolerance in normal operation.
Code 5	(0101):	Flag zero stays true.
Code 6	(0110):	STEP-N received while WRITE GATE-N is true.
Code 7	(0111):	Static WRITE FAULT-N.
Code 8	(1000):	Microprocessor self-test failure, RAM check.
Code 9	(1001):	Microprocessor self-test failure, ROM check.
Code 10	(1010):	No index.
FCODE 11	(1011):	Motor not up to speed.

If a fault code is indicated each time power is applied, replace the drive. If fault code 6 is indicated, check the controller.

**NOTE:** LED2 is only visible with the system unit cabinet removed.



## 18.6. MINISCRIBE MS8425

### 18.6.1. Characteristics MiniScribe MS8425

The MiniScribe MS8425 is a two-platter 20 Mbyte  $3\frac{1}{2}$ " hard disk drive. The drive is mounted internally within the chassis of the system unit, with the activity LED brought out to the front bezel. This LED is also used to display 'Error codes', if a fault should occur during normal operation, or when the drive is strapped for diagnostic mode.

### 18.6.2. Connections MiniScribe MS8425

The drive is interfaced to the system via three connectors, responsible for drive control, data transmission and power. Frame grounding is provided by the chassis mounting.

Control Connector J1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	RESERVED
3	4	RESERVED
5	6	WR GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK0-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 2 <sup>0</sup> 0-N
15	16	(TO J2-7)
17	18	HEAD SELECT 2 <sup>1</sup> 1-N
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	DRIVE SELECT 3-N
31	32	DRIVE SELECT 4-N
33	34	DIRECTION IN-N

Data Connector J2

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SELECTED-N	2	GROUND
3	RESERVED	4	GROUND
5	N.C.	6	GROUND
7	(TO J1-16)	8	GROUND
9	N.C.	10	GROUND
11	GROUND	12	GROUND
13	+ MFM WRITE DATA	14	- MFM WRITE DATA
15	GROUND	16	GROUND
17	+ MFM READ DATA	18	- MFM READ DATA
19	GROUND	20	GROUND

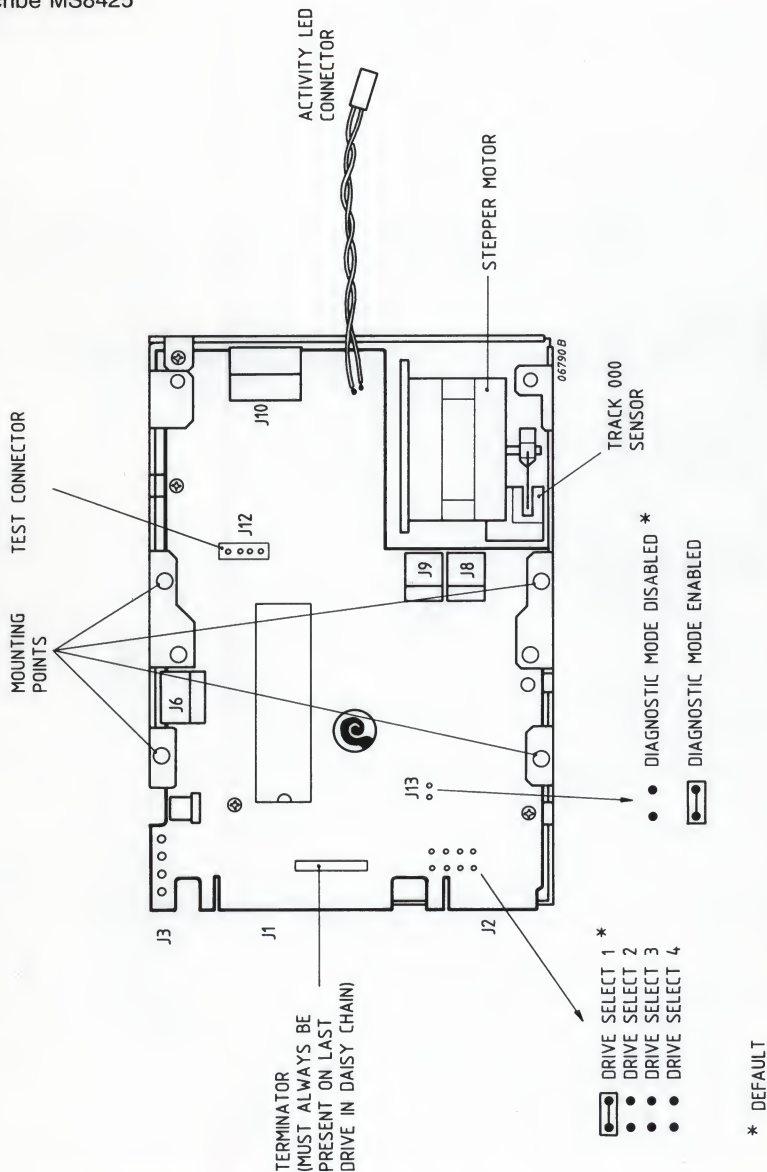
Power Connector J3

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

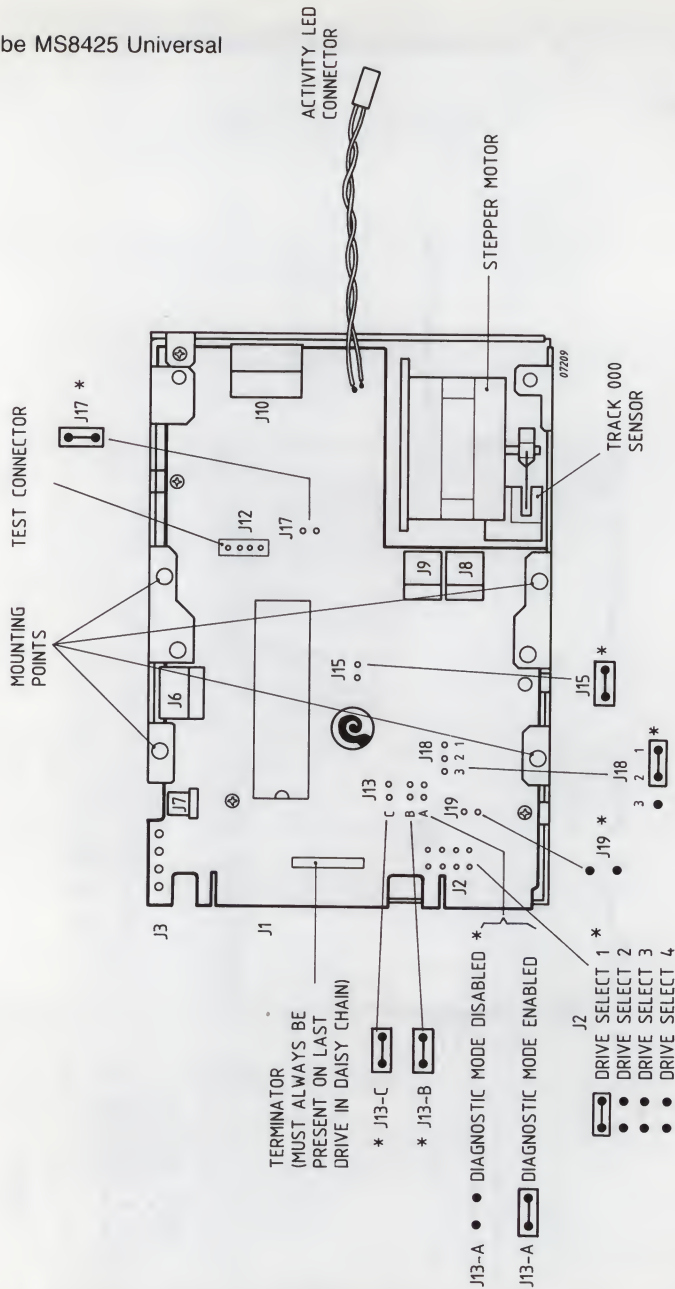


## 18.6.3. Strap Settings / Adjustments MiniScribe MS8425

Miniscribe MS8425



**NOTE:** When installing strap J13 to enable diagnostic mode, it is important that the strap is not removed while the drive is powered up.



**NOTE:** When installing strap J13 to enable diagnostic mode, it is important that the strap is not removed while the drive is powered up.

#### 18.6.4. Modification History MiniScribe MS8425

SI-NR	SUBJECT
P3100-042	Seek errors with MS8425 Hard Disk. Jumper installed for preventing long seek read errors
P3100-046 P3200-019	Soft and hard errors on Miniscribe 8425. New 82 $\mu$ H coils with low distributive capacitance inserted
P3000-074	Absent Static Discharge Block
P3000-075	Thermal runaway of SSI 277 R/W IC

#### 18.6.5. Installation / Maintenance MiniScribe MS8425

To remove the drive firstly remove the drive mounting plate securing screw on the front of the chassis. Supporting the drive with your hand remove the two screws that secure the drive mounting plate to the central chassis member, and remove the connectors from the drive with the drive lowered slightly. Remove the drive and place it on a soft padded surface.

When installing an MS8425, ensure that the drive is correctly strapped, (refer to section 18.12.3.), and that the control and data cables are intended for the MS8425, as some connectors are too big to fit in the limited space available on the small PCB of the MS8425. Lower the drive with its mounting plate fitted into the chassis about half the way in and pass the led connector through the hole in the front panel of the chassis. Continue to lower the drive until it will go no further, then connect the data and control cables. Secure the drive with the three screws then connect the shortest power cable from the power supply to the drive. The drive activity LED is installed on the front mounting plate, next to the power LED, and connected to the LED connector.

## 18.6.6. Diagnostic Functions MiniScribe MS8425

The microprocessor on the MS8425 performs a series of tests during power-up, and then monitors the drive during use. Should a fault condition be detected, the microprocessor indicates the fault type by flashing a code on the activity LED mounted on the front bezel of the PC. If the diagnostic mode strap J13 is present the drive will not enter normal operational mode, but will enter diagnostic mode.

The diagnostic mode of operation has the following sequence of events:-

- Display a five bit microprocessor software revision level on the activity LED.
- Recalibrate and then seek to the shipping zone.
- Display seven zero's on the activity LED, at this time the heads are at the shipping zone and if power is removed they will land there.
- Seek to track four to test for a seek error.
- Start a sequential seek test until power is removed or an error occurs.

Fault codes are in the form of 4 bit binary numbers which are transmitted most significant bit first. The codes will be repeated until the drive power has been reset. A continuous 0.5s of the activity LED represents a binary 1, and flashing for 0.5s represents a 0. Bits are separated by 0.3s off, and cycles of a complete number by 1.0s off.

For example, flash, flash, continuous, flash = 0010 = code 2.

### MS8425 Fault Codes

Code 0	(0000)	Microprocessor RAM error.
Code 1	(0001)	Microprocessor ROM checksum error.
Code 2	(0010)	Interface chip diagnostic failure.
Code 3	(0011)	Write Fault latch will not reset.
Code 4	(0100)	Index pulse not detected during motor spin-up.
Code 5	(0101)	Motor unable to reach 3600 rpm in 30 seconds.
Code 6	(0110)	Unable to stabilize rotational speed in 10 seconds.
Code 7	(0111)	Rotational speed not within 0.5% tolerance.
Code 8	(1000)	Unable to uncover track 000 sensor.
Code 9	(1001)	Unable to cover track 000 sensor.
Code 10	(1010)	Track 000 sensor misadjusted.
Code 11	(1011)	Shipping zone error, crash stop misadjusted.
Code 12	(1100)	Carriage stuck during recalibration.
Code 13	(1101)	Seek error during sequential testing or recalibration.
Code 14	(1110)	No motor hall sensor transitions during spin-up.
Code 15	(1111)	Unexpected interrupt from microprocessor.

If a fault code is indicated each time power is applied, replace the drive. If fault code 9 is indicated, check that sunlight is not interfering with the track 000 optical sensor.





=====

system series: P3000

model: MS 8425 main assy:

nr: P3000-151

date: 3-7-1989 revised:

title: MS 8425 Common Know How.

note: Refer to WS-086 and MSA-034-144

## =====

## A. STICKTION.

As the flying height of disc heads become lower with the increase of data capacity the surface of the disks became smoother.

The natural result is that the heads when landed on the disks, easier stick to the surface due to the very thin air layer between both.

This kind of sticktion can be compared with the natural sticktion of two pieces of glass.

The effect of this sticktion is increased when the head is landed on a warm disk.

As the spindle motor moment applied to the (sticking) heads is bigger when the heads are landed closest to the spindle the user should always stop the drive when the heads are in the landing zone (closest to the spindle). Prior to stop the drive the heads should be parked.

Parking the heads in the landing zone is achieved by issuing the command PARK or SHUTDOWN prior to switching off the computer system.

Additional a small percentage of the Miniscribe 8425 suffers from grease/oil leaking from the spindle motor fluid seal (refer to MSA-034-144 and WS-086).

Due to this leakage the down side of the lower disk becomes contaminated resulting in increase of both sticktion and read/write errors.

In some cases the spindle motor moment can not overcome this sticktion and the drive will not start.

Drives suffering from this leaking grease can only be sent to Concern Service for repair.

## B. DEFECT TRACKS.

When manufactured or repaired the media flaws on each disk are determined and noted on the defect track table stuck to the outside of the HDA.

No defect track table is written on any place on the disk surface due to the fact that manufacturer or repairer do not know which format will be applied to the drive by the user.

This means that all bad spots from the table must be indicated to the system at the time of the low level format (INITHD/WDHDMINIT)

Responsibility: Y. Bouman





revised:

nr: P3000-151

C. TEMPERATURE GRADIENT

see SI 3000-075

The temperature gradient specified for this drive is 10° C per hour.

This means that when ever a drive is exchanged in a system it should be acclimatised prior to the low level format.

E.g. when the drive's temperature is 10°C it should acclimatise for at least one hour.

D. FAILURE DESCRIPTION

All written remarks from the Customer Engineer that ease the repair action in the repair centre are welcome.

CS will not remove any repair hint that is added to the drive.

Note that the defective drive should be returned in the original packing and that the heads must be parked.

In case of HDA or logic failure it is not always possible to park the heads.

## 18.7. MINISCRIBE 8425XT

### 18.7.1. Characteristics Miniscribe 8425XT

The MiniScribe 8425XT is a 20 Mbyte, 3.5 inch hard disk drive which makes use of a subset of the PC-XT I/O Channel Interface. The drive is mounted internally within the chassis of the system unit, with the activity LED brought out to the front bezel.

### 18.7.2. Connections Miniscribe 8425XT

The drive is interfaced to the system via two connectors, a 40-conductor ribbon cable, responsible for data transmission and a 4-pin connector for power. Frame grounding is provided by the chassis mounting.

PC-XT I/O Channel Interface Connector J1

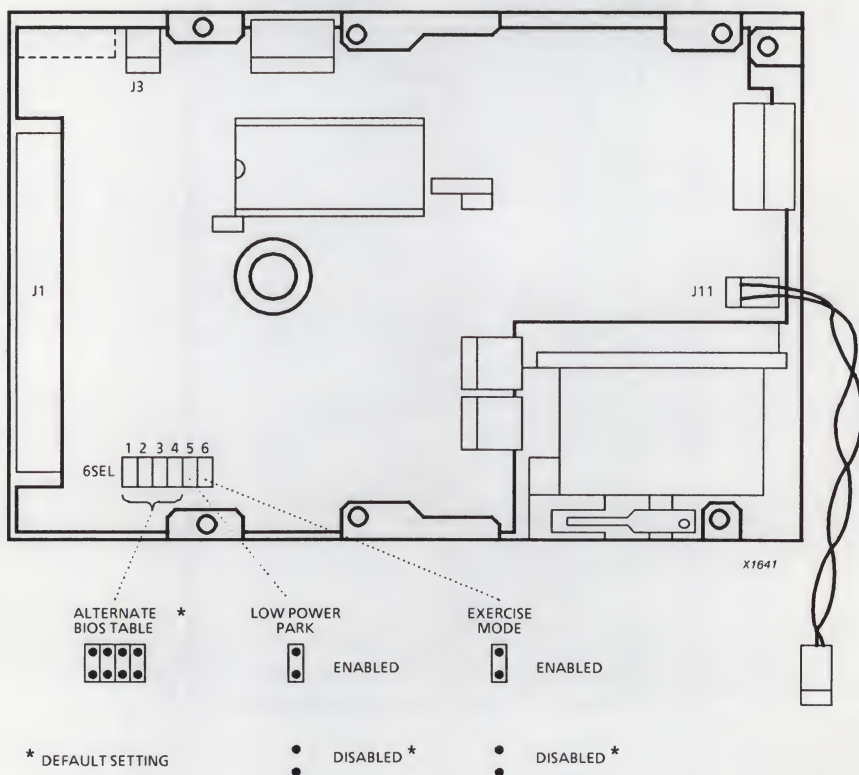
GROUND RETURN	SIGNAL PIN	SIGNAL NAME
2	1	RESET
4	3	DATA BIT 7
6	5	DATA BIT 6
8	7	DATA BIT 5
10	9	DATA BIT 4
12	11	DATA BIT 3
14	13	DATA BIT 2
16	15	DATA BIT 1
18	17	DATA BIT 0
20	19	GROUND
22	21	AEN
24	23	I/O WR -N
26	25	I/O RD -N
28	27	DMACK3-N
30	29	DREQ3
32	31	IRQ5
34	33	A1
36	35	A0
38	37	HDCS-N
40	39	N.C.

## Power Connector J3

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

## 18.7.3. Strap Settings / Adjustments Miniscribe 8425XT

### Strap Settings Miniscribe 8425XT



#### 18.7.4. Modification History MiniScribe 8425 XT

SI-NR	SUBJECT
P3100-060	Introduction of new version of Miniscribe 8425.
P3000-074	Absent Static Discharge Block
P3000-075	Thermal runaway of SSI 277 R/W IC





## 18.8. CM100 CD-ROM DRIVE

### 18.8.1. Characteristics CM100 CD-ROM Drive

The CM100 Compact Disc Read Only Memory is a disc drive giving a host computer random access to data stored on Compact Disc ROM media. The 12 cm CD-ROM discs have a formatted capacity of approximately 600 Mbytes and can be inserted and removed by the operator.

The CM100 is a highly reliable, easy to operate, table-top unit which can be plugged into an ordinary AC outlet.

It is available in two versions:

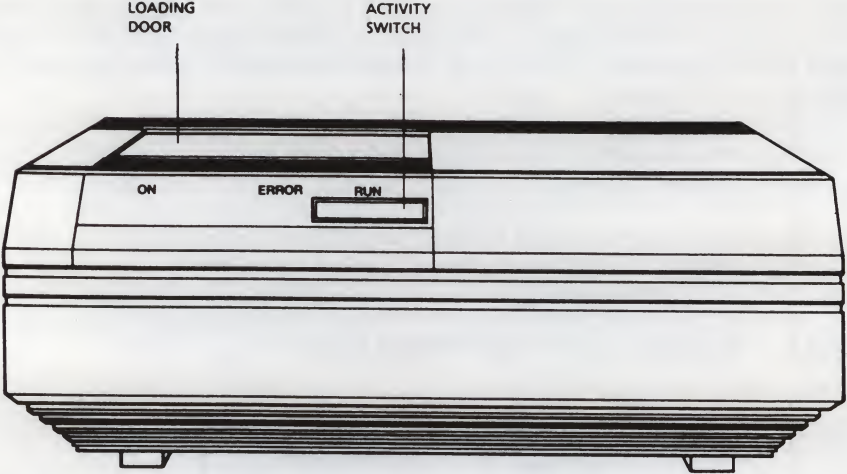
-CM100/25 for AC line voltages 100 - 120 VAC nominal.

-CM100/30 for AC line voltages 220 - 240 VAC nominal.

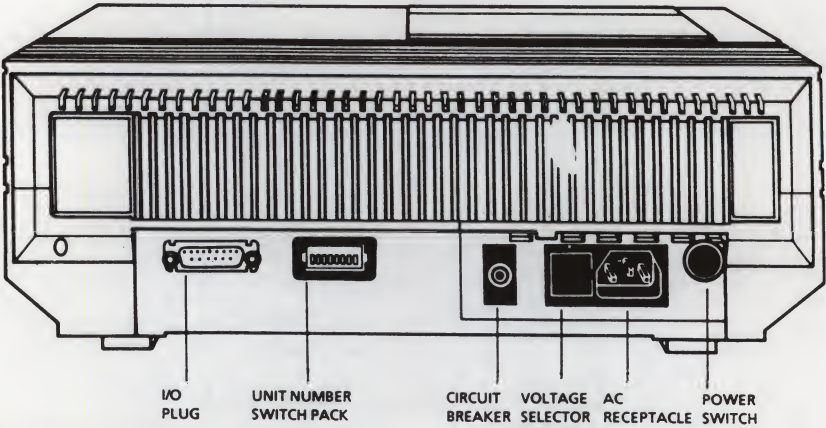
### 18.8.2. Connections CM100 CD-ROM Drive

SIGNAL PIN	SIGNAL NAME
1	RESPONSE +
2	RESPONSE -
3	COMMAND +
4	COMMAND -
5	DATA +
6	DATA -
7	DATA CLOCK +
8	DATA CLOCK -
9	ATTENTION +
10	ATTENTION -
11	ONLY FOR MAINTENANCE
12	ONLY FOR MAINTENANCE
13	ONLY FOR MAINTENANCE
14	ONLY FOR MAINTENANCE
15	GROUND

Locator



Front indicators and controls



Rear connections and controls

### 18.8.3. Strap Settings / Adjustments CM100 CD-ROM Drive

#### Set the unit number

The CM100 can be assigned any unit number from 0 to 254. The desired number, in binary notation, can be set by using the unit number switch pack on the rear panel (see figure on page 18.15-2).

Switch 1 sets the MSB of the unit number; switch 8 sets the LSB.

UNIT NUMBER	SWITCH NUMBER							
	1	2	3	4	5	6	7	8
0 *)	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	1	0
3	0	0	0	0	0	0	1	1
4	0	0	0	0	0	1	0	0
5	0	0	0	0	0	1	0	1
6	0	0	0	0	0	1	1	0
7	0	0	0	0	0	1	1	1
246	1	1	1	1	0	1	1	0
247	1	1	1	1	0	1	1	1
248	1	1	1	1	1	0	0	0
249	1	1	1	1	1	0	0	1
250	1	1	1	1	1	0	1	0
251	1	1	1	1	1	0	1	1
252	1	1	1	1	1	1	0	0
253	1	1	1	1	1	1	0	1
254	1	1	1	1	1	1	1	0
255	RESERVED, NOT TO BE USED							

'0': switch lever upwards; '1': switch lever downwards

\*) Default setting

### **18.8.5. Installation / Maintenance CM100 CD-ROM Drive**

Check for the correct voltage setting for either 100 or 120 VAC (Model CM100/25);  
for model CM100/30 check for either 220 or 240 VAC.



## 18.9. MINISCRIBE 6032, 6053, 6085

### 18.9.1. Characteristics Miniscribe 6032, 6053, 6085

The Miniscribe 5.25" hard disk drives differ only in the number of platters internally installed, so the capacity will be different.

When power is removed from the drive, the carriage will automatically retract and be latched in a non data area located at the inner most position of the disk.

The drives are also available as fixed disk upgrades to the system.

### 18.9.2. Connections Miniscribe 6032, 6053, 6085

The drive is interfaced to the system via three connectors, responsible for drive control, data transmission and power. Frame grounding is provided by the chassis mounting.

Control Connector J1

GROUND RETURN	SIGNAL	SIGNAL NAME
1	2	RESERVED
3	4	HEAD SELECT 2'2-N
5	6	WRITE GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK ZERO-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 2'0-N
15	16	RESERVED
17	18	HEAD SELECT 2'1-N
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	DRIVE SELECT 3-N
31	32	DRIVE SELECT 4-N
33	34	DIRECTION IN-N



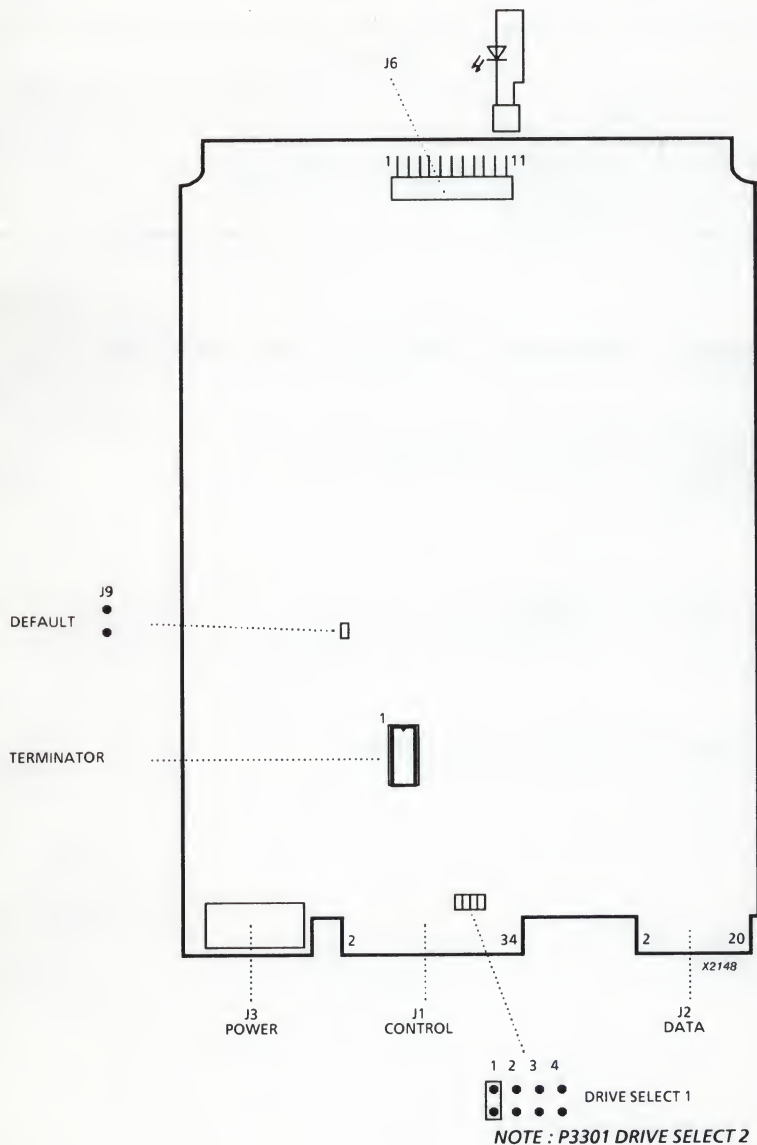
## Data Connector J2

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SELECTED-N	2	GROUND
3	RESERVED	4	GROUND
5	N.C.	6	GROUND
7	RESERVED	8	GROUND
9	N.C.	10	N.C.
11	N.C.	12	GROUND
13	+ MFM WRITE DATA	14	-MFM WRITE DATA
15	GROUND	16	GROUND
17	+ MFM READ DATA	18	-MFM READ DATA
19	GROUND	20	GROUND

## Power Connector J3

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

### 18.9.3. Strap Settings / Adjustments Miniscribe 6032, 6053, 6085



#### 18.9.4. Modification History Miniscribe 6032, 6053, 6085

SI-NR	SUBJECT
P3200-008	Circuit failure on Miniscribe 6032 at power on / off switching (Hardware modification)
P3200-018	Drive adjustment after PCB exchange
P3200-034	Motor voltage regulator problems (Hardware modification)
P3200-042	Whistling Miniscribe Drives

#### 18.9.5. Installation / Maintenance Miniscribe 6032, 6053, 6085

##### P320x:

- Remove the drive with bracket by removing 3 screws.
- Remove the drive from the bracket by removing 4 screws.
- Disconnect the cables.

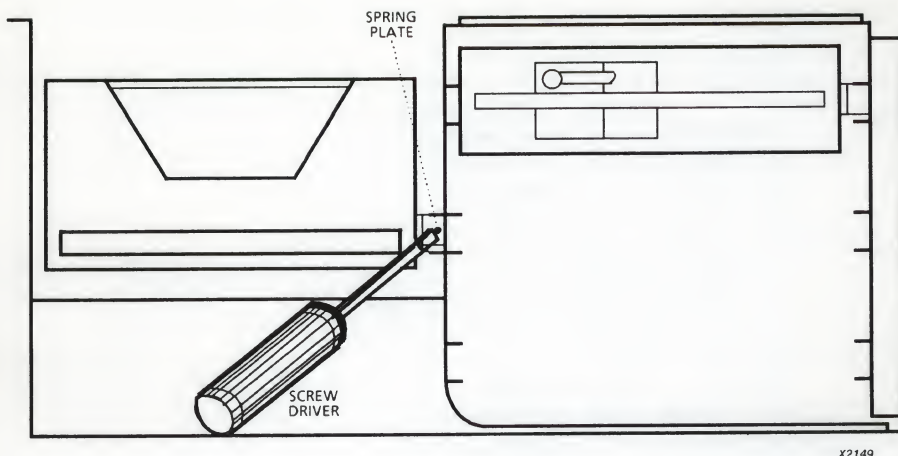
##### P3301:

###### Removal:-

- Disconnect the interface- and power cables on the drive.
- Put a screwdriver between the springplate and the housing.
- Slide the drive forward.

###### Replacement:-

- Slide the drive backward until the springplate snaps.
- Connect the cables.



### 18.9.6. Diagnostic Functions Miniscribe 6032, 6053, 6085

The microprocessor on the drive performs a series of tests during power-up, and then monitors the drive during use. Should a fault condition be detected, the microprocessor indicates the fault type by flashing a code on the power LED (refer to 18.9.3.). This LED should be connected to pin 10 and 11 of connector J6 on the drive control PCB. If the diagnostic mode strap j9 is present the drive will not enter normal operation mode, but will enter a seek exercise routine. Error codes are displayed in a morse-code type manner, most significant bit first. Ones are indicated by a 0.5 second ON mode. Zeros are indicated by a 0.5 second FLASHING mode. The LED remains off 0.5 seconds between bits Flashed. Five bits make a binary word and words are separated by a one second LED Off time.

Example fault code: Code 1A = 11010:

1	1	0	1	0
0.5 sec On 0.5 sec Off	0.5 sec On 0.5 sec Off	0.5 sec Flashing 0.5 sec Off	0.5 sec ON 0.5 sec Off	0.5 sec Flashing 0.5 sec Off

## Error Code Definition:

- 00 = Microprocessor RAM Error
- 01 = Microprocessor ROM Checksum error
- 02 = Interface chip Diagnostic error
- 03 = Write Fault-N will not Reset
- 04 = Index pulse not detected or lost
- 05 = Unable to Maintain spin speed within 5%
- 06 = Loss of = FINE TK during idle mode
- 07 = More than one seek retry
- 08 = Time Out on + END DECEL Signal
- 09 = Time Out on track crossing (-cyl pulse)
- 0A = Overshoot
- 0B = Time Out on + fine TK
- 0C = + TK0 signal not detected
- 0D = Comparator mismatch
- 0E = Reserved
- 0F = Unexpected interrupt from Microprocessor
- 10 = Time Out on GB Pattern
- 11 = Time Out on GB1 Pattern
- 12 = Time Out on GB2 Pattern
- 13 = Reserved
- 14 = Voltage Unsafe with WRTGATE-N Inactive
- 15 = Voltage Unsafe with WRTGATE-N Active
- 16 = Chip Unsafe (WRITE FAULT-N)
- 17 = Step pulses received with WRTGATE-N active
- 18 = Time Out on + END DECEL Signal
- 19 = Time Out on Track Crossing (CYL-N PULSE)
- 1A = Overshoot
- 1B = Time Out on + FINE TK
- 1C = + TK0 Signal not detected
- 1D = Comparator mismatch
- 1E = Reserved
- 1f = 6301 Trap

**NOTE:** codes 08,09 = During a Seek  
codes 0A,0B,0C,0D = After a Seek  
codes 10,11,12,18,19,1A = During a Re-zero  
codes 1b,1c,1d = After a Re-zero

If fault code 17 is indicated, check the controller.



## **18.10. MICROPOLIS 1375**

### **18.10.1. Characteristics Micropolis 1375**

The Micropolis 1375 5.25" hard disk drive has a built in intelligent controller and is fully compatible with the industry standard Small Computer Systems Interface (SCSI).

The unformatted capacity of the drive is 170.6 MB which results in a formatted capacity of 149.82MB (512-byte format).

When power is removed from the drive, the carriage will automatically retract and be latched in a non data area.

## 18.10.2. Connections Micropolis 1375

The drive is interfaced to the system via four connectors. Signal connector J1, power connector J3, and ground connectors J4 and J5 on the head/disk assembly and outer frame respectively.

### Signal Connector J1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	DATABUS0-N
3	4	DATABUS1-N
5	6	DATABUS2-N
7	8	DATABUS3-N
9	10	DATABUS4-N
11	12	DATABUS5-N
13	14	DATABUS6-N
15	16	DATABUS7-N
17	18	DATABUS PARITY-N
19	20	GROUND
21	22	GROUND
23	24	GROUND
*	26	TERMINATOR POWER™
27	28	GROUND
29	30	GROUND
31	32	ATTENTION-N
33	34	GROUND
35	36	BUSY-N
37	38	ACKNOWLEDGE-N
39	40	RESET-N
41	42	MESSAGE-N
43	44	SELECT-N
45	46	CONTROL DATA-N
47	48	REQUEST-N
49	50	INPUT/OUTPUT-N

\* All odd pins, except pin 25 are ground. Pin25 should be left open.

\*\* Pin 26 Provides optional terminator power (+ 5VDC) for the terminator packs on the board

## Power Connector J3

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC

### 18.10.3. Strap Settings / Adjustments Micropolis 1375

Up to eight devices can be attached to an SCSI bus. The Micropolis 1375 has three ID jumpers used to assign one of the eight SCSI ID bits (0-7) to the drive. To access the straps on the component side of the PCB loosen the two screws at the SCSI connector side. Then turn the PCB over.

# W18 BUS PARITY CHECK

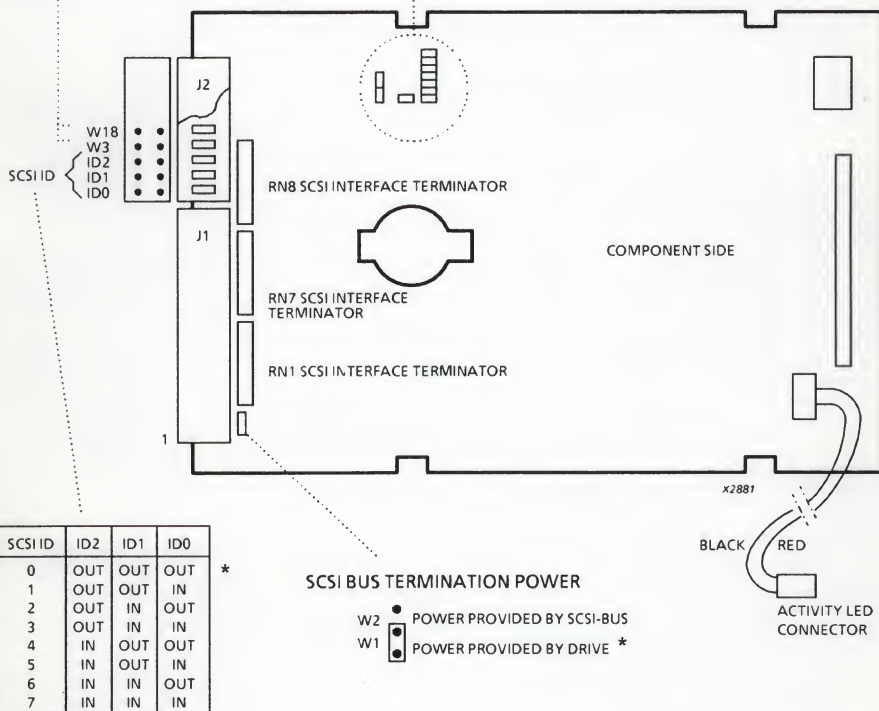
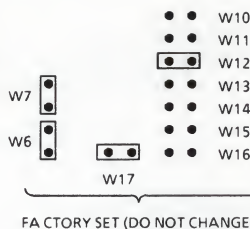
● ● PARITY ENABLED \*

◐ ● PARITY DISABLED

# W3 SPINDLE MOTOR CONTROL

● ● MOTOR STARTS AT POWER ON \*

◐ ● MOTOR STARTS AFTER RECEIVING START SPINDLE COMMAND



\* DEFAULT

**NOTE:** Interface Terminators RN1, RN7 and RN8 are installed only on the last physical drive in the chain



### 18.10.5. Installation/Maintenance Microplis 1375

- Disconnect the cables
- Remove the drive with bracket by removing 3 screws
- Remove the drive from the bracket by removing 4 screws.

## **18.11. RODIME 3057S, 3085S**

### **18.11.1. Characteristics Rodime 3057S, 3085S**

The Rodime 3057S and 3085S are 3.5" hard disk drives.

The formatted capacity of the Rodime 3057S is 45.26MB, the formatted capacity of the Rodime 3085S is 69.90MB.

The drive is fully compatible with the industry standard Small Computer Systems Interface (SCSI).

The carriage is automatically latched at the ID landing zone at power down.

## 18.11.2. Connections Rodime 3057S, 3085S

The drive is interfaced to the system via two connectors; a 50-way SCSI connector and a power connector.

### SCSI Connector P1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	DATABUS0-N
3	4	DATABUS1-N
5	6	DATABUS2-N
7	8	DATABUS3-N
9	10	DATABUS4-N
11	12	DATABUS5-N
13	14	DATABUS6-N
15	16	DATABUS7-N
17	18	DATABUS PARITY-N
19	20	GROUND
21	22	GROUND
23	24	GROUND
*	26	TERMINATOR POWER**
27	28	GROUND
29	30	GROUND
31	32	ATTENTION-N
33	34	GROUND
35	36	BUSY-N
37	38	ACKNOWLEDGE-N
39	40	RESET-N
41	42	MESSAGE-N
43	44	SELECT-N
45	46	CONTROL/DATA-N
47	48	REQUEST-N
49	50	INPUT/OUTPUT-N

\* All odd pins, except pin 25 are ground. Pin25 should be left open.

\*\* Pin 26 Provides optional terminator power (+ 5VDC) for the terminator packs on the board

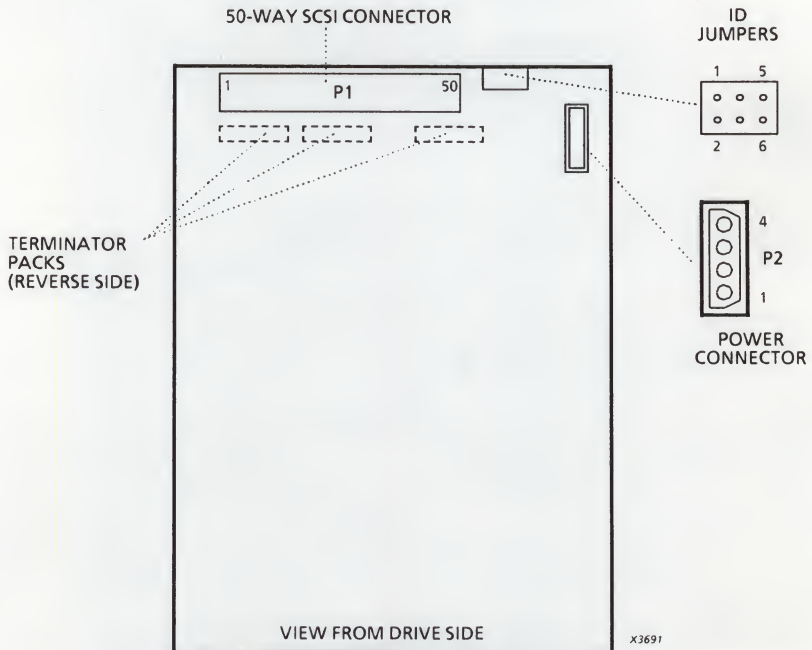
## Power Connector P2

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC

### 18.11.3. Strap Settings/Adjustments Rodime 3057S, 3085S

Up to eight devices can be attached to an SCSI bus. The Disk Drive has three ID jumpers used to assign one of the eight SCSI ID bits (0-7) to the drive.

SCSI ID	ID JUMPERS		
	PINS 1-2	PINS 3-4	PINS 5-6
0	OUT	OUT	OUT
1	OUT	OUT	IN
2	OUT	IN	OUT
3	OUT	IN	IN
4	IN	OUT	OUT
5	IN	OUT	IN
6	IN	IN	OUT
7	IN	IN	IN



**NOTE: THE TERMINATOR PACKS SHOULD ONLY BE INSTALLED ON THE LAST DRIVE IN THE CHAIN**



### **18.11.5. Installation/Maintenance Rodime 3057S, 3085S**

- Disconnect the cables
- Remove the drive with bracket by removing 3 screws
- Remove the drive from the bracket by removing 4 screws

### 18.11.6. Diagnostic Functions Rodime 3057S, 3085S

If the drive has a fatal error, it will switch off power to both the voice coil and spindle motors and flash the fatal error code on the select LED on the front panel. The drive will still respond to commands sent across the SCSI interface, but will not execute any of them except Test Drive Ready, Inquiry or Request Sense.

#### Led Error Codes

HEX CODE	DEFINITION
01	The drive has detected that the spindle motor speed is out of tolerance ( $\pm 10\%$ )
02	Program memory checksum error: during its internal diagnostic, the drive detected a program memory checksum error
05	Ram error: the drive detected a data error during the ram sector buffer diagnostic
06	After stepping the maximum number of cylinders, the drive could not achieve correct track zero status
07	The spindle motor did not start at power up
08	Spindle motor failed initial $\pm 1\%$ speed check at power up
0A	No track crossing signal during a seek
0B	No servo data
0C	+ 12V supply failure

## **18.12. WESTERN DIGITAL 93028-A/93048-A**

### **18.12.1. Characteristics Western Digital 93028-A/93048-A**

The Western Digital 93028-A and 93048-A are 3.5 inch hard disk drives incorporating the IDE interface with embedded controller.

The 93028-A is a 20 MB hard disk with two read/write heads, the 93048-A is a 40 MB hard disk with four read/write heads.

### 18.12.2. Connections Western Digital 93028-A/93048-A

The drive is interfaced to the system via three connectors; a 40-way interface connector, 2-way LED connector and a 4-way power connector.

#### Host Interface (IDE) Connector J2

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	RST-N	21	AEN
2	GND	22	GND
3	SD7	23	IOW-N
4	SD8	24	GND
5	SD6	25	IOR-N
6	SD9	26	GND
7	SD5	27	Not Connected
8	SD10	28	Not Connected
9	SD4	29	Not Connected
10	SD11	30	GND
11	SD3	31	IRQ14
12	SD12	32	IOCS16-N
13	SD2	33	SA1
14	SD13	34	Reserved
15	SD1	35	SA0
16	SD14	36	SA2
17	SD0	37	CS0-N
18	SD15	38	CS1-N
19	GND	39	ACTIVE-N
20	Key	40	GND

#### Power Supply Connector J1

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC

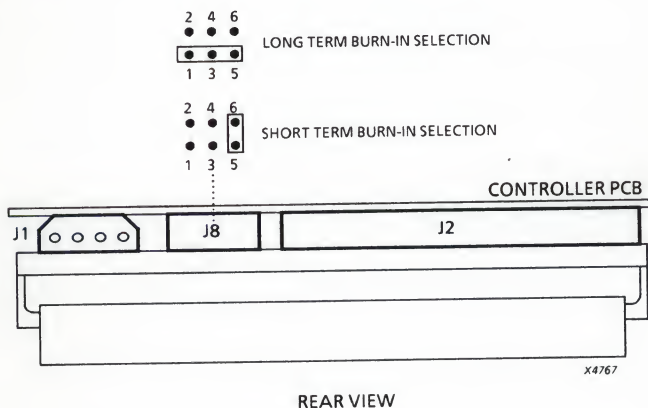
## LED Activity Indicator Connector J6

PIN No.	SIGNAL NAME
1	ACTIVE-N
2	R5V

## Self-test Connector J8

PIN No.	SIGNAL NAME
1	J8A
2	GND
3	J8B
4	GND
5	J8C
6	GND

## 18.12.3. Strap Settings/Adjustments Western Digital 93028-A/93048-A





### 18.12.5. Installation/Maintenance Western Digital 93028-A/93048-A

To install the 93028-A, 93048-A perform the following procedure:

- Verify that the correct strap selection has been made on J8, for normal operation no straps are required on J8. To invoke one of the diagnostic modes, J8 must be strapped, refer to 18.12.6.
- Use the mounting screws supplied with the drive to mount the drive assembly in the PC (use the correct screws as screws that are too long will incorrectly ground the casting)
- Connect the host interface cable to J2, LED indicator cable to the LED assembly and power cable to J1

### 18.12.6. Diagnostic Functions Western Digital 93028-A/93048-A

Both the 93028-A and 93048-A comprise a 6-pin vertical header connector J8 which can be used to invoke two self tests. These are as follows:

#### Short Term Burn-in (Pins 5 and 6 shorted together)

When pins 5 and 6 are shorted together, the drive goes into a short term burn-in loop following a reset or after power-on (the drive does not accept any commands during this time). The short term burn-in comprises a repeatable loop performing the following tests:

- ROM checksum verification
- Sector buffer RAM test
- WD42C22 register test
- Microprocessor internal RAM test
- Format and scan ID on cylinder 782 (all heads)
- Speed verification
- Servo burst test
- Stepper motor test

If any of the tests fail, or if the strap is removed, the heads are parked and the drive idles with the indicator LED switched off.

#### Long Term Burn-in (Pins 1, 3 and 5 shorted together)

When pins 1, 3 and 5 are shorted together, the drive goes into a long term burn-in loop following a reset or after power-on (the drive does not accept any commands during this time).

**Caution:** *When this jumper is installed, the drive is formatted and ALL data is lost (this option should not normally be invoked except at the factory).*

The long term burn-in first parks the heads, formats the disk then performs various I/O read/write operations to determine any media defects. If any of the tests fail, or if the strap is removed, the heads are parked and the drive idles with the indicator LED switched off.



## **18.13. MINISCRIBE 8225XT/8450XT**

### **18.13.1. Characteristics Miniscribe 8225XT/8450XT**

The Miniscribe 8225XT and 8450XT are 3.5 inch hard disk drives incorporating a customized XT interface with embedded controller.

The 8225XT is a 20 MB hard disk with two read/write heads, the 8450XT is a 40 MB hard disk with four read/write heads.

The 8225XT and 8450XT are PC/XT compatible, incorporating all drive and control logic in one assembly.

Both of these drives use a type of address translation, enabled by strap J12 (refer to 18.13.3.). When address translation is enabled on the 8450XT, the drive appears to the system as two drives of 20 MB each.

### 18.13.2. Connections Miniscribe 8225XT/8450XT

The drive is interfaced to the system via three connectors; a 40-way interface connector, 2-way LED connector and a 4-way power connector.

#### Host Interface Connector J1

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	RST	21	AEN
2	GND	22	GND
3	DB7	23	IOWR-N
4	GND	24	GND
5	DB6	25	IORD-N
6	GND	26	GND
7	DB5	27	DACK-N
8	GND	28	GND
9	DB4	29	DRQ
10	GND	30	GND
11	DB3	31	IRQ
12	GND	32	GND
13	DB2	33	A1
14	GND	34	GND
15	DB1	35	A0
16	GND	36	GND
17	DB0	37	CS0-N
18	GND	38	GND
19	GND	39	LED-N
20	Key	40	GND

#### Power Supply Connector J3

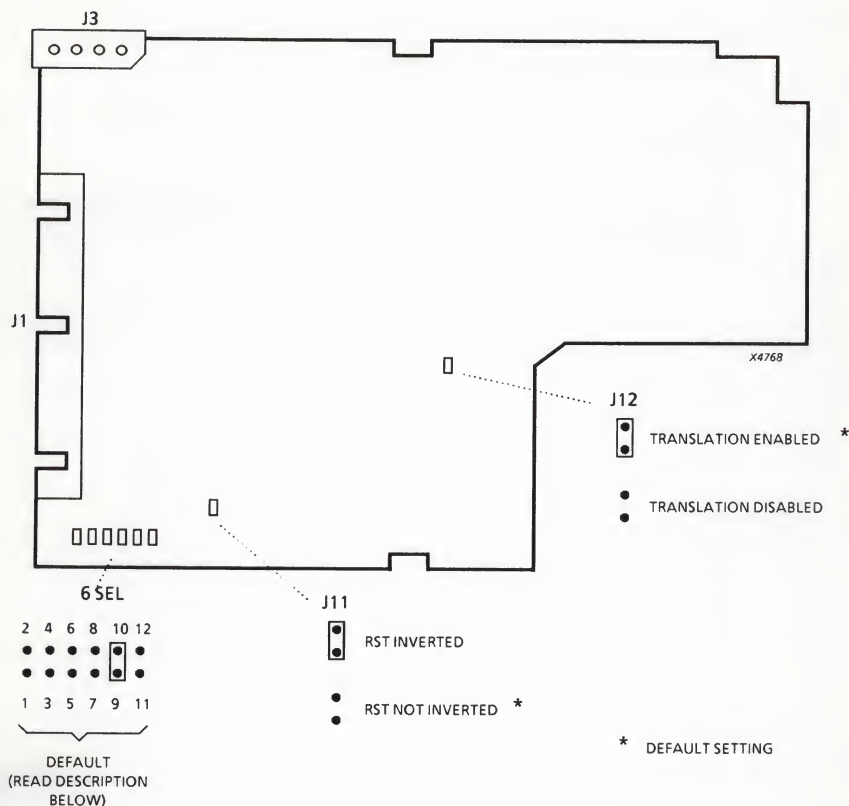
PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC

#### LED Activity Indicator Connector

PIN No.	SIGNAL NAME
1	LED-N
2	+ 5VDC



### 18.13.3. Strap Settings/Adjustments Miniscribe 8225XT/8450XT



The default settings for the 6SEL straps are shown above. Straps 1-2, 3-4, 5-6 and 7-8 are omitted by default, and are not used. Strap 9-10 is inserted and is used to invoke the low power/head park function. This ensures that if the drive is not selected within 30 s, the heads are moved to the park zone (physical cylinder 820). Power is then removed from the stepper motor, thus reducing power consumption. When the next read/write operation to the drive is performed, the heads are stepped to the selected cylinder and the operation is performed as normal. Strap 11-12 is used to invoke the drive exerciser option, if a strap is present in this position then the drive enters exercise mode after completing its power-on diagnostics. Continuous seeks are performed by the drive and any resulting error is reported by a code flashed on the activity LED (see sub-section 18.13.6.). If there is no strap present in this position (default) the drive enters normal operating mode after completing the power-on diagnostics.

### 18.13.5. Installation/Maintenance Miniscribe 8225XT/8450XT

To install the 8225XT or 8450XT, perform the following procedure:

- Verify that the correct strap selections have been made
- Use the mounting screws supplied with the drive to mount the drive assembly in the PC
- Connect the host interface cable to J1, LED indicator cable to the LED assembly and power cable to J3

### 18.13.6. Diagnostic Functions Miniscribe 8225XT/8450XT

The microprocessor on the 8225XT/8450XT performs a series of tests during power-up, and then monitors the drive during use. Should a fault condition be detected, the microprocessor indicates the fault type by flashing a code on the activity LED. Fault codes are in the form of 4-bit binary numbers which are transmitted most significant bit first. The codes are repeated until the drive power is reset. A 0.5 s continuous on condition represents a logical '1', a 0.5 s flashing condition represents a logical '0'. Bits are separated by a 0.3 s interval, and repeat cycles are separated by a 1 s interval.

For example, the following code represents that there are no hall transitions during spin-up (hexadecimal code E):

0.5 s ON (logical '1')  
0.3 s OFF  
0.5 s ON (logical '1')  
0.3 s OFF  
0.5 s ON (logical '1')  
0.3 s OFF  
0.5 s FLASHING (logical '0')  
1.0 s OFF

The complete list of fault codes is given in the following table.

CODE	ERROR
0	Microprocessor RAM error
1	Not used
2	Not used
3	Write fault latch will not reset
4	Index pulse not detected during spin-up
5	Unable to reach 3600 RPM in 800 revolutions
6	Unable to stabilize spin speed in 10 s
7	Unable to maintain spin speed to within 0.5% of nominal
8	Unable to uncover track zero sensor
9	Unable to cover track zero sensor
A	Track zero interrupter misadjusted
B	Shipping zone error, crash stop misadjusted
C	Not used
D	Seek error during burn-in or recalibration
E	No hall transition during spin-up
F	Unexpected interrupt from microprocessor

These drives must not be tested with versions of the F-DIAG program below revision 8.2, as this will result in the flaw map on the drive being overwritten.



## 18.14. Rodime 3055

### 18.14.1. Characteristics Rodime 3055

The Rodime 3055 is a 3.5 inch hard disk drive incorporating an ST412 interface. It comprises four disks, and provides fast data storage and access.

### 18.14.2. Connections Rodime 3055

The drive is interfaced to the system via three connectors; a 34-way interface connector, 20-way data connector and a 4-way power connector.

Host Interface Connector J1

GROUND RETURN	SIGNAL	SIGNAL NAME
1	2	RESERVED
3	4	RESERVED
5	6	WRITE GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK ZERO-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 0-N
15	16	RESERVED
17	18	HEAD SELECT 1-N
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	DRIVE SELECT 3-N
31	32	DRIVE SELECT 4-N
33	34	DIRECTION IN-N



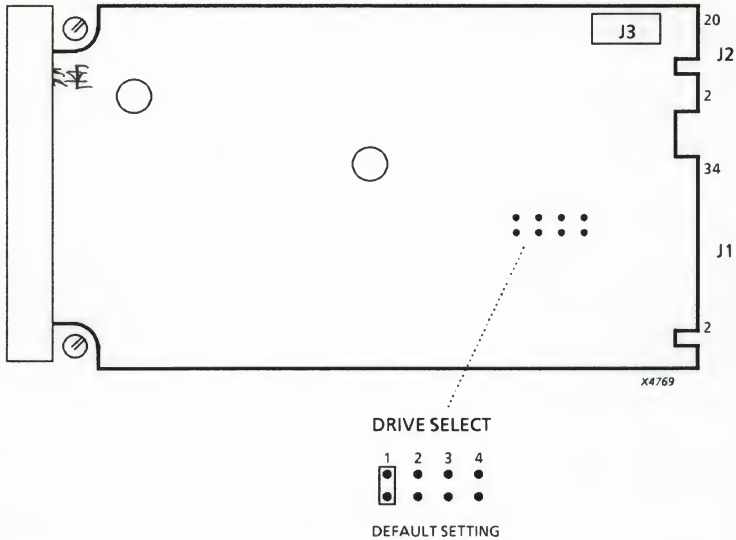
## Data Connector J2

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	SELECTED-N	2	GROUND
3	RESERVED	4	GROUND
5	N.C.	6	GROUND
7	RESERVED	8	GROUND
9	N.C.	10	GROUND
11	GROUND	12	GROUND
13	+ MFM WRITE DATA	14	-MFM WRITE DATA
15	GROUND	16	GROUND
17	+ MFM READ DATA	18	-MFM READ DATA
19	GROUND	20	GROUND

## Power Supply Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC

### 18.14.3. Strap Settings/Adjustments Rodime 3055



### 18.14.5. Installation/Maintenance Rodime 3055

If the Rodime 3055 is being installed as a replacement for the Miniscribe 6053, ensure that you have the correct mounting bracket and power cable adapter. To install the Rodime 3055, perform the following procedure:

- Verify that the correct strap selections have been made
- Use the mounting screws supplied with the drive to mount the drive assembly in the PC
- Connect the host interface cable to J1, and data cable to J2. Use the power cable adapter to connect a suitable hard disk power connector from the power supply to the disk assembly power connector J3.

## 18.14.6. Diagnostic Functions Rodime 3055

The microprocessor on the Rodime 3055 performs a series of tests during power-up, and then monitors the drive during use. Should a fault condition be detected, the microprocessor indicates the fault type by flashing a code on the red LED mounted on the front panel, and shuts down the spindle motor.

Fault codes are in the form of 4-bit binary numbers which are transmitted with the most significant bit first. The codes will be repeated until the drive power has been reset. A long flash represents a logical '1', and a short flash a logical '0'.

For example: short, short, long, short = 0010 = code 2.  
                  0      0      1      0

During power-up, the following fault codes may be indicated; 1, 2, 3, 8, 9, 10 and 11. During operation, the following codes may be indicated; 4, 5, 6 and 7. The meaning of these codes is detailed below.

### Rodime 3055 Fault Codes:

Code 1	(0001):	No sync.
Code 2	(0010):	No track zero.
Code 3	(0011):	Motor speed outside +/- 1% tolerance at the end of power up.
Code 4	(0100):	Motor speed outside + 10%/-5% tolerance in normal operation.
Code 5	(0101):	Seek error.
Code 6	(0110):	STEP-N received while WRITE GATE-N is true.
Code 7	(0111):	Static WRITE FAULT-N.
Code 8	(1000):	Microprocessor self-test failure, RAM check.
Code 9	(1001):	Microprocessor self-test failure, ROM check.
Code 10	(1010):	No index.
Code 11	(1011):	Motor not up to speed.

If a fault code is indicated each time power is applied, replace the drive. If fault code 6 is indicated, check the controller.



system series: P3200      model: P3202      main assy:      nr. P3000-087  
Hard Disk

Units affected: All units with Rodime 3055 hard disk.

date: 880829 revised:

Title: 45 MB HDD for P3202.

note: VU PR 148 (MSA-034)

1. General: The 45MB P3202 systems are equipped with a new hard disk drive - the Miniscribe MS6053 HDD is now replaced with the Rodime 3055 HDD. The MS 6053 will be a "repair only" item at Concern Service and Serv. 12NC: 5322 218 80334 will remain for this HDD.
2. Tip: As the new drive Rodime drive is a 3.1/2" version and not form/fit to the older MS 6053 drive a few additional items are needed for this Rodime drive, if a MS 6053 is replaced with a Rodime 3055.

- Rodime 3055 hard disk drive      Serv. 12NC: 5322 693 22061
- Mounting bracket for Rodime 3055 HDD      Serv. 12NC: 5322 466 92289
- Power cable adaptor      Serv. 12NC: 5322 321 23047

The current BIOS 1.5 does not support the parameters of the new rodime HDD, so they have to be replaced by BIOS level 1.51.

- U37 = 5107 299 70885 - Odd BIOS - Checksum 7100
- U47 = 5107 299 70895 - Even BIOS - Checksum B600

These BIOS PROMs can be ordered as normal by:

Philips Telecommunication and Data Systems Nederland BV  
Customer Service Logistics, MR. H. Vlottes, Order desk.  
P.O. Box 245, 7300 AE Apeldoorn/The Netherlands  
Telex 36345, Routing indicator NLACCSM.

Note: The setup utility of MS DOS 3.21.02 shows the wrong type of HDD at 'type 5', although the parameters are correct as for the Rodime 3055. So ignore the 'name' at type 5 for the time being.

The following strap setting is applicable for this rodime drive.  
Location 1 = drive 1 (\* =default )  
Location 2 = drive 2  
Location 3 = drive 3  
Location 4 = drive 4

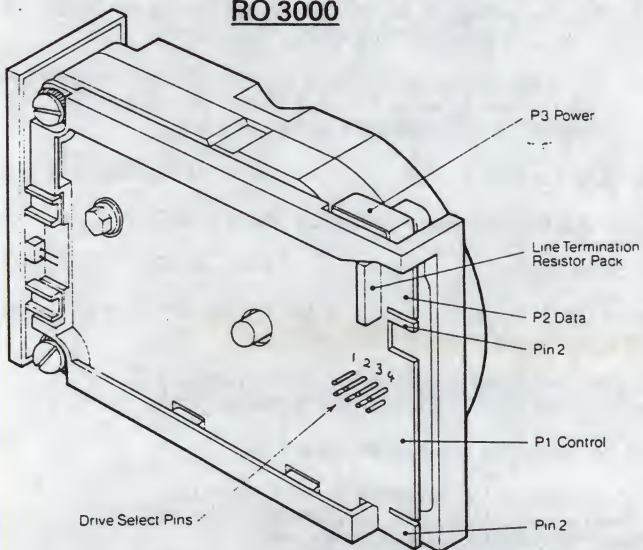
See next page for physical strap locations.

Responsibility: C. v.d. Hout.





## RO 3000





## 18.15. CM201/CM121 CD-ROM DRIVE

### 18.15.1. Characteristics CM201/CM121 CD-ROM Drive

The CM201 is a 5 $\frac{1}{4}$ " half height drive which can be built into a PC. The CM201 is interfaced to the system via a CM153 CD-ROM controller. The CM201 is the successor of the CM100 and is designed to use the 12 cm CD-ROM disks. The drive is a front loading device and the disks are inserted using a special protective caddy.

The CM121 is a table top device based upon the CM201. The CM121 has a built in power supply and ventilator. A built-in internal audio interface is optional. This drive can be connected to a PC via a CM153 CD-ROM controller (refer to chapter 12 for installation of the CM153). On both drives there is an activity LED which is used to indicate the status of the drive, as detailed in the table below.

LED CONDITION	INDICATION
Off	No disk present
Flashing at 1 Hz	Disk is in drive and ready for operation, or, disk is spinning
Flashing at 5 Hz	Data transfer in operation
On	Disk can be removed from drive

The CM121 has an additional LED that indicates power on/off.

### 18.15.2. Connections CM201/CM121 CD-ROM Drive

#### 18.15.2.1. Connections CM201

Power connector

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

## Digital I/O Connector

SIGNAL PIN	SIGNAL NAME	SIGNAL PIN	SIGNAL NAME
1	RESPONSE +	2	GROUND
3	COMMAND +	4	GROUND
5	DATA +	6	+ 5 VDC
7	DATA CLOCK +	8	+ 5 VDC
9	ATTENTION +	10	+ 5 VDC
11	Maintenance for drive only	12	Maintenance for drive only
13	Maintenance for drive only	14	Maintenance for drive only
15	GROUND	16	GROUND

## Digital Audio Connector

SIGNAL PIN	SIGNAL NAME	SIGNAL PIN	SIGNAL NAME
1	WORD SELECT	2	ERROR FLAG
3	CLOCK	4	GROUND
5	DATA	6	+ 5 VDC
7	DE-EMPHASIS	8	+ 12 VDC
9	RIGHT OUTPUT ENABLE	10	LEFT OUTPUT ENABLE

### 18.15.2.2. Connections CM121

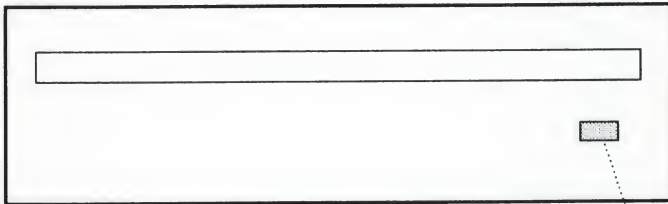
## Digital I/O Connector

SIGNAL PIN	SIGNAL NAME	SIGNAL PIN	SIGNAL NAME
1	RESPONSE +	9	ATTENTION +
2	RESPONSE -	10	ATTENTION -
3	COMMAND +	11	Drive Maintenance
4	COMMAND -	12	Drive Maintenance
5	DATA +	13	Drive Maintenance
6	DATA -	14	Drive Maintenance
7	CLOCK +	15	GROUND
8	CLOCK -		

### 18.15.3. Strap Settings/Adjustments CM201/CM121 CD-ROM Drive

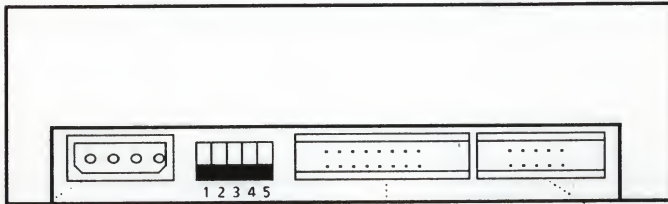
On the back of the CM201 are 5 dip switches. Switches 1 to 4 are used for trouble shooting purposes. For normal operation set all four switches to 0. The fifth switch is available to select the lock option. If the lock option is activated, switch 5 is set to 1, it is not possible to unload a disk during power on, except after an adequate I/O command has been given by the system. If the lock option is not installed, switch 5 is set to 0, it is always possible to remove disks during power on. The lock option is not supported.

On the CM121 the same switches are present, but they can be accessed only when the cover is removed.



FRONT VIEW CM201

ACTIVITY LED



POWER CONNECTOR

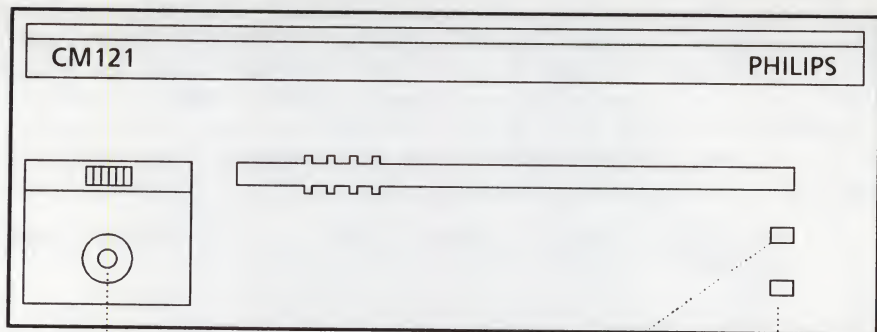
DIP SWITCHES

DIGITAL I/O CONNECTOR

DIGITAL AUDIO CONNECTOR

REAR VIEW CM201

X4770

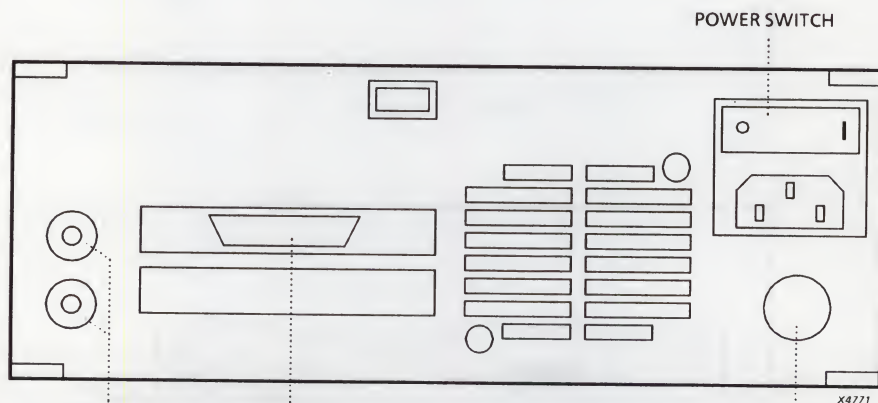


STEREO  
HEADPHONE JACK

ACTIVITY LED

POWER INDICATOR LED

FRONT VIEW CM121



STEREO  
AUDIO OUTPUTS

DIGITAL I/O  
CONNECTOR

POWER SWITCH

AC POWER  
SELECTOR

REAR VIEW CM121



## 18.16. CM210/CM131 CD-ROM DRIVE

### 18.16.1. Characteristics CM210/CM131 CD-ROM Drive

The CM210 and the CM131 are CD-ROM drives with a Small Computer System Interface (SCSI). They are both based upon the CM201 CD-ROM drive. The CM210 CD-ROM drive is a half height 5¼" built-in drive. It consists of a CM201 CD-ROM drive with a CM161 SCSI controller card mounted on top of the drive. The controller card translates the native interface of the CM201 to the SCSI standard interface.

The CM131 CD-ROM drive is a table top model and looks in appearance like the CM121 CD-ROM drive. The difference lies in the extra CM161 SCSI controller card and the two SCSI connectors on the rear side. It has its own power supply which is selectable for 110 VAC or 220 VAC.

On both drives there is an activity LED which is used to indicate the status of the drive, as detailed in the table below.

LED CONDITION	INDICATION
Off	No disk present
Flashing at 1 Hz	Disk is in drive and ready for operation, or, disk is spinning
Flashing at 5 Hz	Data transfer in operation
On	Disk can be removed from drive

On the CM131 CD-ROM drive there is an additional LED which indicates power on/off.

**Note:** Due to the height of the CM210, this drive will occupy two drive bays.



## 18.16.2. Connections CM210/CM131 CD-ROM Drive

For the connectors on the basic drive unit CM201 (power connector, digital I/O connector, audio connector) refer to 18.30.2.

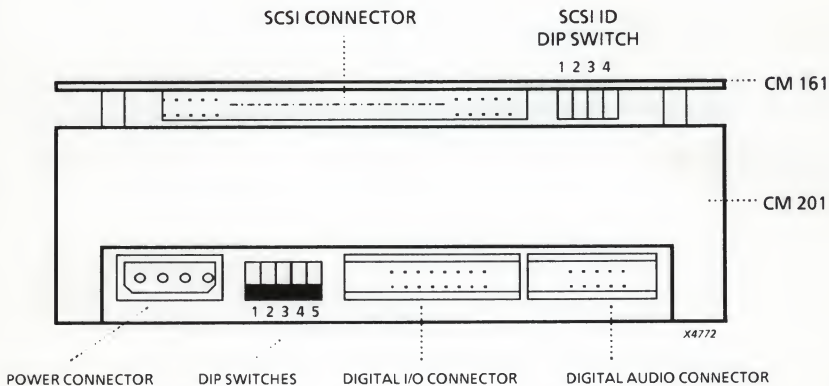
### SCSI Connector J2

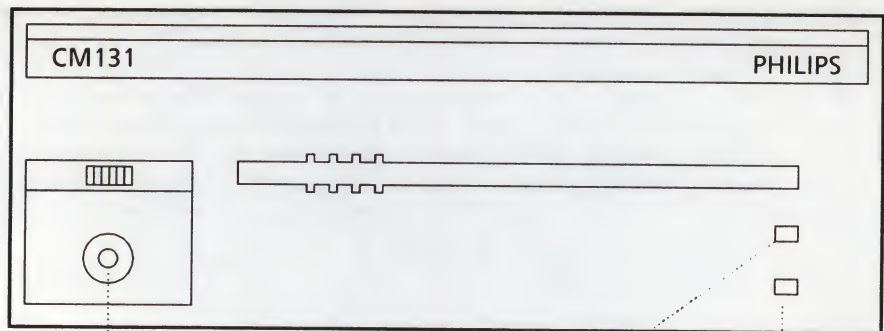
GROUND RETURN	PIN NUMBER	SIGNAL NAME
1	2	DB(0)-N
3	4	DB(1)-N
5	6	DB(2)-N
7	8	DB(3)-N
9	10	DB(4)-N
11	12	DB(5)-N
13	14	DB(6)-N
15	16	DB(7)-N
17	18	DB(P)-N
19	20	GROUND
21	22	GROUND
23	24	GROUND
Pin 25 NC	26	TRMPWR
27	28	GROUND
29	30	GROUND
31	32	ATN-N
33	34	GROUND
35	36	BSY-N
37	38	ACK-N
39	40	RST-N
41	42	MSG-N
43	44	SEL-N
45	46	C/D-N
47	48	REQ-N
49	50	I/O-N

### 18.16.3. Strap Settings/Adjustments CM210/CM131 CD-ROM Drive

On the basic drive unit there are 5 dip switches. Switches 1 to 4 are used for trouble shooting purposes. For normal operation set all four switches to 0. The fifth switch is available to select the lock option. If the lock option is activated, switch 5 is set to 1, it is not possible to unload a disk during power on, except after an adequate I/O command has been given by the system. If the lock option is not installed, switch 5 is set to 0, it is always possible to remove disks during power on. The lock option is not supported. On the SCSI interface board there are 4 dip switches. SW1 to SW3 are used for setting the SCSI ID number. These SCSI ID numbers must be set differently for each device in the daisy chain. The SCSI ID number for the CM210 and the CM131 is set according to the table below. SW4 is used for testing and must be set to ON for normal operation.

SCSI ID	SW1	SW2	SW3
0	OFF	OFF	OFF
1	OFF	OFF	ON
2	OFF	ON	OFF
3	OFF	ON	ON
4	ON	OFF	OFF
5	ON	OFF	ON
6	ON	ON	OFF
7	ON	ON	ON



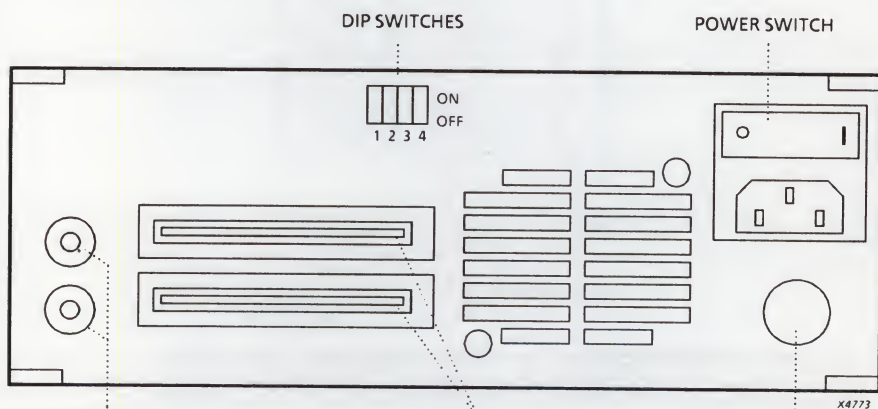


STEREO  
HEADPHONE JACK

ACTIVITY LED

POWER INDICATOR LED

FRONT VIEW CM131



STEREO  
AUDIO OUTPUTS

SCSI I/O  
CONNECTORS

AC POWER  
SELECTOR

REAR VIEW CM131

### 18.15.5. Installation/Maintenance CM201/CM121 CD-ROM Drive

When installing a CM201 CD-ROM drive, make sure that all dip switches are set to 0 (up = 1, down = 0).

When installing a CM121 CD-ROM drive, set the voltage selector to the correct position (either 110 Vac or 220 Vac).

**Note:** *Due to a collision of DMA channels, a CD-ROM drive cannot be installed in a P31XX using a hard disk drive with embedded controller. This problem can be solved by using an XT storage adapter (refer to section 12.10.).*





## 18. HARD DISK DRIVES

Section:

Page:

1: Technical Overview	18.1-1
1.1: Option Cross Reference Guide	18.1-1
1.2: Technical Data	18.1-3

2: Miniscribe MS2012	18.2-1	18.2-1	18.2-3	18.2-4	18.2-4	18.2-4
3: Miniscribe MS3012	18.3-1	18.3-1	18.3-3	18.3-4	18.3-4	18.3-4
4: Miniscribe MS3212	18.4-1	18.4-1	18.4-3	18.4-4	18.4-4	18.4-4
5: Rodime RO352	18.5-1	18.5-1	18.5-3	n.a.	18.5-4	18.5-4
6: Miniscribe MS8425	18.6-1	18.6-1	18.6-3	18.6-5	18.6-5	18.6-6
7: Miniscribe 8425XT	18.7-1	18.7-1	18.7-3	18.7-4	18.7-4	18.7-5
8: CM100 CD-ROM Drive	18.8-1	18.8-1	18.8-3	n.a.	18.8-4	n.a.
9: Miniscribe 6032, 6053, 6085	18.9-1	18.9-1	18.9-3	18.9-4	18.9-4	18.9-5
10: Micropolis 1375	18.10-1	18.10-2	18.10-4	n.a.	18.10-6	n.a.
11: Rodime 3057S, 3085S	18.11-1	18.11-2	18.11-4	n.a.	18.11-5	n.a.
12: Western Digital 93028-A/93048-A	18.12-1	18.12-2	18.12-3	n.a.	18.12-4	18.12-5
13: Miniscribe 8225XT/8450XT	18.13-1	18.13-2	18.13-3	n.a.	18.13-4	18.13-5
14: Rodime 3055	18.14-1	18.14-1	18.14-3	n.a.	18.14-4	18.14-5

Subsection:

1	Characteristics	↑
2	Connections	↑
3	Strap Settings / Adjustments	↑
4	Modification History	↑
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6	Diagnostic Functions	↑

**NOTE:** n.a. means that this section is not available for this unit.

Section:

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15: CM201/CM121 CD-ROM Drive	<i>CM153</i>	18.15-1	18.15-1	18.15-3	n.a.	18.15-5	n.a.
16: CM210/CM131 CD-ROM Drive	<i>SCSI</i>	18.16-1	18.16-2	18.16-3	n.a.	18.16-5	n.a.
17: Micropolis 1355	<i>130</i>	18.17-1	18.17-1	18.17-3	n.a.	18.17-4	n.a.
18: Micropolis 1558-15	<i>338</i>	18.18-1	18.18-1	18.18-3	n.a.	18.18-4	n.a.
19: Micropolis 1654-7	<i>160</i>	18.19-1	18.19-1	18.19-3	n.a.	18.19-4	n.a.
20: Micropolis 1664-7	<i>344</i>	18.20-1	18.20-1	18.20-3	n.a.	18.20-4	n.a.
21: Miniscribe MS8225AT		18.21-1	18.21-1	18.21-2	n.a.	18.21-2	18.21-2
22: Western Digital 93028-X / 93038-X 93048-X		18.22-1	18.22-1	18.22-3	n.a.	18.22-4	18.22-4
23: Rodime 3058A / 3088A 3128A		18.23-1	18.23-1	18.23-2	n.a.	18.23-3	18.23-3
24: Connor CP3104/CP3204		18.24-1	18.24-1	18.24-3	n.a.	18.24-5	n.a.
25: Miniscribe 8051A		18.25-1	18.25-1	18.25-3	n.a.	18.25-4	n.a.
26: Seagate ST125A/ST157A		18.26-1	18.26-1	18.26-3	n.a.	18.26-4	n.a.
27: Micropolis 1588-15		18.27-1	18.27-1	18.27-3	n.a.	18.27-4	n.a.
28: Micropolis 1684-7		18.28-1	18.28-1	18.28-3	n.a.	18.28-4	n.a.
29: Micropolis 1674-7		18.29-1	18.29-1	18.29-3	n.a.	18.29-4	n.a.
30: Seagate ST2383E		18.30-1	18.30-1	18.30-3	n.a.	18.30-4	n.a.
31: Quantum LPS105AT		18.31-1	18.31-1	18.31-3	n.a.	18.31-4	n.a.
32: Maxtor 7080A		18.32-1	18.32-1	18.32-3	n.a.	18.32-4	n.a.
33: Seagate ST4766E ESDI		18.33-1	18.33-1	18.33-3	n.a.	18.33-4	n.a.
34: Seagate ST4766N SCSI		18.34-1	18.34-1	18.34-3	n.a.	18.34-4	n.a.

Subsection:

- 1 Characteristics
  - 2 Connections
  - 3 Strap Settings / Adjustments
  - 4 Modification History
  - 5 Installation / Maintenance
  - 6 Diagnostic Functions
- 

**NOTE:** n.a. means that this section is not available for this unit.

Section:

Page:

35: Seagate ST1144A	18.35-1	18.35-1	18.35-2	n.a.	18.15-3	n.a.
36: Seagate ST351A/X	18.36-1	18.36-1	18.16-2	n.a.	18.16-3	n.a.
37: Seagate ST1400	18.37-1	18.37-1	18.37-2	n.a.	18.17-3	n.a.
38: Connor CP30104	18.38-1	18.38-1	18.38-2	n.a.	18.18-3	n.a.
39: Seagate ST2383N	18.39-1	18.39-1	18.39-2	n.a.	18.19-3	n.a.
40: West. Dig. WDAC2200	18.40-1	18.40-1	18.40-2	n.a.	18.40-2	n.a.
41: West. Dig. WDAC280	18.41-1	18.41-1	18.41-2	n.a.	18.41-2	n.a.
42: Conner CP30084	18.42-1	18.42-1	18.42-2	n.a.	18.42-2	n.a.

Subsection:

- 1 Characteristics
- 2 Connections
- 3 Strap Settings / Adjustments
- 4 Modification History
- 5 Installation / Maintenance
- 6 Diagnostic Functions

**NOTE:** n.a. means that this section is not available for this unit.





## 18.1. TECHNICAL OVERVIEW

### 18.1.1. Option Cross Reference Guide

OPTION	P 2 1 2 0	P 2 2 3 0	A V E R G	P31xx					P32xx					P33xx										P 3 4 6 4	P 3 4 0 0	P91xx						
				0	0	0	0	2	0	0	0	0	0	3	3	0	0	4	4	4	5	6	6			7	7	3	3	6	6	7
				1	2	2	5	I	II	I	II	4	0	8	1	2	5	8	0	0	1	0	0			5	0	0	5	0	5	0
2: Miniscribe MS2012				x																												
3: Miniscribe MS3012				x																												
4: Miniscribe MS3212				x																												
5: Rodime RO352					x	x																										
6: Miniscribe MS8425					x	x				x	x	x																				
7: Miniscribe MS8425XT							x																									
8: CM100 CD-ROM Drive					x	x	x	x			x	x																				
9: Miniscribe 6032, 6053, 6085									x	x	x				x	x								x	x							
10: Micropolis 1375																x									x		x					
11: Rodime 3057S, 3085S																x									x		x					
12: Western Digital 93028-A												x																				
13: Miniscribe 8225XT/ 8450XT		x					x																									
14: Rodime 3055												x																				
15: CM201/CM121 CD-ROM Drive	x	x				x	x	x	x	x	x	x	x	x	x		x			x												
16: CM210/CM131 CD-ROM Drive																																
17: Micropolis 1355																			x													
18: Micropolis 1558-15																			x		x					x		x				
19: Micropolis 1654-7																			x		x					x		x				
20: Micropolis 1664-7																										x		x				
21: Miniscribe MS8225AT		x										x																				
22: Western Digital WD93028-XT WD93038-XT		x						x																								
23: Rodime RO3058A RO3088A RO3128A														x	x				x													
														x	x				x	x												



OPTION	P 2 1 2 0	P 2 2 3 0	A V E N G	P31xx					P32xx					P33xx										P 3 4 6 4	P 3 4 0 0	P91xx				
				0	0	0	0	2	0	0	0	0	3	3	0	0	4	4	5	6	6	7	0			3	3	6	6	7
				1	2	2	5	0	0	0	2	4	0	8	1	2	5	8	0	0	1	0	0			5	0	5	0	5
24: Connor CP3104/CP3204																			X											
25: Miniscribe 8051A													X					X												
26: Seagate ST125A/ ST157A			X									X	X				X	X												
27: Micropolis 1588-15																														
28: Micropolis 1684-7																						X								
29: Micropolis 1674-7																														
30: Seagate ST2383E																														
31: Quantum LPS105AT																			X		X									
32: Maxtor 7080A																			X		X									
33: Seagate ST4766E ESDI																						X	X							
34: Seagate ST4766N SCSI																								X						

SPECIFICATION HARD DISK DRIVES	CONNER CP3044	CONNER CP3104
Formatted capacity (MB) Indicated in SETUP (1MB = 1024*1024 Bytes)	40,9 40	100 100
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	1047 - 2 40 (41) 1:1 Fixed No	776 - 8 33 1:1 Fixed No
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate* ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	Translate    504 4 40 1:1 Fixed Yes	Translate    776 8 33 1:1 Fixed Yes
Positioner type: Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Emb. Servo No ?	Emb. Servo No ?
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	8 25 50 8,4	8 25 45 8,4
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	1400 30871 2,7 RLL N / A N / A 3557 4,5 MBytes/s	1150 23441 2,7 RLL N / A N / A 3575 4.75 MBytes/s
Start Time ( sec ) Stop Time ( sec )	7 5	15 15
Interface	IDE AT	IDE AT
POWER REQUIREMENTS + 5V + 12V + 5V Start-Up + 12V Start-Up	0,16 A typ 0,1 A typ 0,28 A max 0,7 A max	0,16 A typ 0,18 A typ 0,3 A max 1,8 A max
Form Factor Dimensions (mm) Weight (kg)	3,5" 0,33H 146 x 102 x 25 0,5	3,5" HH 146 x 102 x 41 0,82
12 NC	5322 218 80756	5322 218 80778

\* Translate Mode: In this mode the Logical Parameters are user definable and supplied by the Host BIOS using the Set Parameters command. A few basic rules must be taken into account: 1) Number of heads shall not exceed 15. 2) Number of cylinders shall not exceed 1024 (some BIOS levels do support counts above 1024). 3) The total number of logical sectors shall not exceed the number of available physical sectors

SPECIFICATION HARD DISK DRIVES	CONNER CP3204	CONNER CP30104	CONNER CP30084
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes	202,8 202	116 116	80,2 80
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	1366 - 8 38 1:1 Fixed No	1524 - 4 39 1:1 Fixed No	1053 - 4 39 1:1 Fixed No
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate * ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	Translate    683 16 38 1:1 Fixed Yes	Translate    762 8 39 1:1 Fixed Yes	Translate    526 8 39 1:1 Fixed Yes
Positioner type Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Emb. Servo No ?	Emb. Servo No ?	Emb. Servo No ?
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	5 16 35 8.61	8 19 35 8.8	3 19 35 8.8
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	1700  2,7 RLL N / A N / A 3485 4.5 MBytes/s	1850 33184 2,7 RLL N / A N / A 3400 4.5 MBytes/s	1400 33184 2,7 RLL N / A N / A 3400 4,5 MBytes/s
Start Time ( sec ) Stop Time ( sec )	15 15	15 15	15 15
Interface	IDE AT	IDE AT	IDE AT
POWER REQUIREMENTS +5V +12V +5V Start-Up +12V Start-Up	0.16 A typ 0.22 A typ 0.3 A max 2.0 A max	0.08 A typ 0.18 A typ 0.38 A max 1,1 A max	0.08 A typ 0.18 A typ 0,38 A max 1.1 A max
Form Factor Dimensions (mm) Weight (kg)	3.5" HH 146 × 102 × 41 0.91	3.5" HH 146 × 102 × 25 0.59	3.5" 0.33H 102 × 146 × 25 0.59
12 NC	5322 218 80779	4822 693 91505	4822 693 91577

\* See remark page 18.1-3

SPECIFICATION HARD DISK DRIVES	MAXTOR 7080A
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes	81,41 81
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	1171 - 4 36 1:1 Fixed Yes
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate * ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETER # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	Translate, 17 sectors / track  981 10 17 1:1 Fixed Yes
Positioner type: Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Emb. Servo No ?
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	6 17 35 8.1
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	1490 30625 1,7 RLL N / A N / A 3703 5,4 MBytes /s
Start Time ( sec ) Stop Time ( sec )	7,5 8
Interface	IDE AT
POWER REQUIREMENTS +5V +12V +5V Start-Up +12V Start-Up	0.07 A typ 0.12 A typ 0,3 A max 1.0 A max
Form Factor Dimensions (mm) Weight (kg)	3.5" 0.33H 146 x 102 x 25 0.5
12 NC	5322 693 22985

\* See remark page 18.1-3



SPECIFICATION HARD DISK DRIVES	MINISCRIBE 2012	MINISCRIBE 3012	MINISCRIBE 3212	MINISCRIBE 8225AT
Formatted capacity (MB) Indicated in SETUP 1MB = 1024*1024 Bytes	10,16 10	10,16 10	10,16 10	20,42 20
PHYSICAL PARAMETERS # Cylinders # Reserved cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed	306 - 4 17 System dep. Yes	612 - 2 17 System dep. Yes	612 - 2 17 System dep. Yes	747 - 2 28 1:1 Fixed Yes
Only for IDE Drives Power up MODE: native ( = physical parameters ) translate* ( = logical parameters ) in 17 or any sectors / track LOGICAL default PARAMETERS # Cylinders # Heads # Sectors (512B) / track Interleave Low level format possible ? Yes / No / Not allowed				Translate 17 Sect tr  615 4 17 Fixed Yes
Positioner type Stepper / Servo Surface / Emb. Servo Head Park necessary ? Head landing cylinder	Stepper Yes 336	Stepper Yes 656	Stepper Yes 656	Stepper Yes 820
SEEK TIMING Track to Track ( ms ) Average ( ms ) Maximum ( ms ) Average Latency ( ms )	3 93 229 8.33	3 160 420 8.33	3 85 190 8.33	12 40 90 8.33
Track Density ( TPI ) Recording Density ( BPI ) Recording method Write precompensation at track Reduced Write current at track Rotational Speed ( RPM ) Data Transfer Rate ( Mbits/s )	588 10000 MFM 128 306 3600 5	588 10000 MFM 128 3600 5	588 10030 MFM 128 612 3600 5	898 2,7 RLL N / A 3600 5
Start Time ( sec ) Stop Time ( sec )	20 20	20 20	20 15	15 15
Interface	ST412 / 506	ST412 / 506	ST412 / 506	IDE AT
POWER REQUIREMENTS +5V +12V +5V Start-Up +12V Start-Up	1.0 A typ 1.5 A typ 1.0 A max 3.5 A max	1.0 A typ 0.9 A typ 1.0 A max 4.3 A max	0.75 A typ 0.75 A typ 1.0 A max 3.0 A max	0.55 A typ 0.75 A typ 0.65 A max 2.4 A max
Form Factor Dimensions (mm) Weight (kg)	5.25" FH 150 × 203 × 86 2.5	5.25" HH 150 × 203 × 43 1.6	5.25" HH 150 × 203 × 43 1.6	3.5" HH 150 × 102 × 41 0.74
12 NC	5322 693 12501	5322 218 80082	5322 218 80148	5322 218 80697

\* See remark page 18.1-3



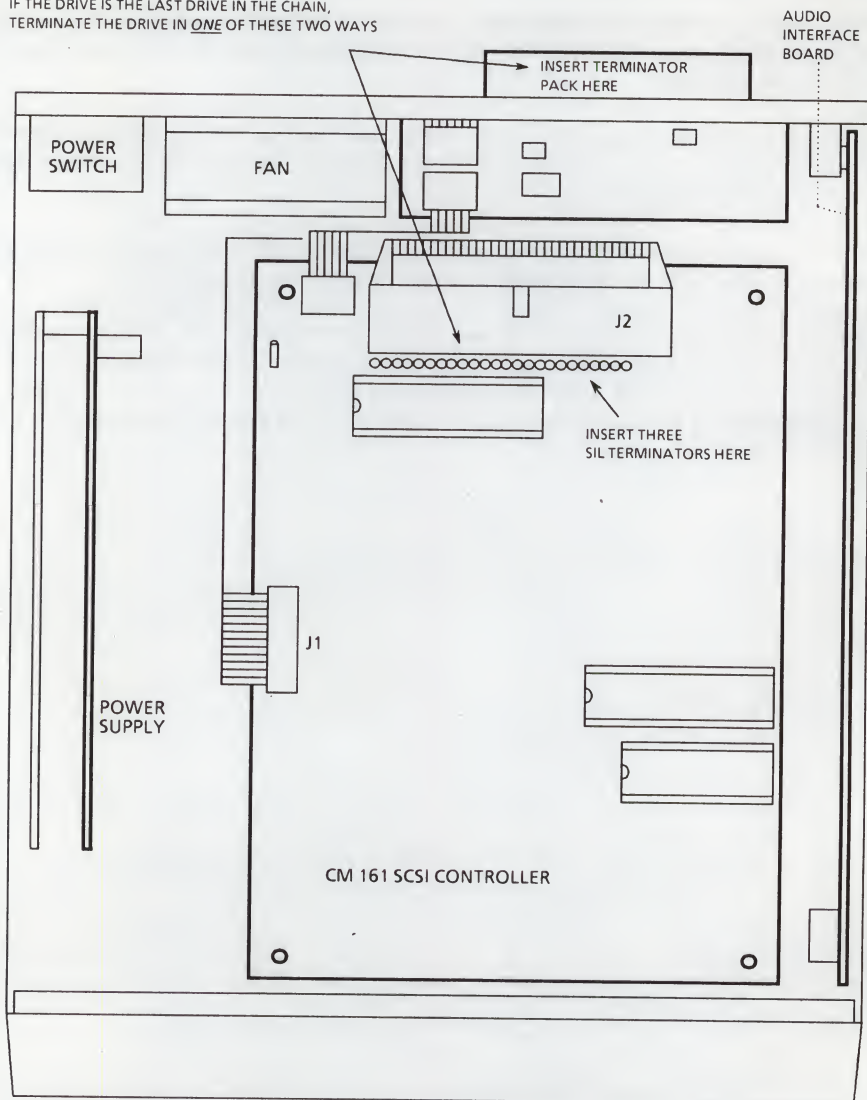
## 18.16.5. Installation/Maintenance CM210/CM131 CD-ROM Drive

When installing a CM210 CD-ROM drive, make sure that all dip switches on the basic drive unit CM201 are set to 0 (up = 1, down = 0), and that the SCSI ID dip switches are set to the correct setting.

When installing a CM131 CD-ROM drive, make sure that the voltage selector is set to the correct position (either 110 Vac or 220 Vac) and that the SCSI ID dip switches are set to the correct setting.

The SCSI bus must be terminated with resistors at both ends of the bus. In practice this means that if the CM210 or the CM131 is to be the last device in a daisy chain, a terminator must be installed. This can be done by inserting three SIL terminators in a connector behind the SCSI connector on the CM161 interface card. Another possibility is the use of a special terminator pack which can be placed on the second connector of the CM131. If a CD-ROM drive is not the last drive in the chain, remove the terminators. A diagram showing the locations used for terminating the drives is given on the next page.

IF THE DRIVE IS THE LAST DRIVE IN THE CHAIN,  
TERMINATE THE DRIVE IN ONE OF THESE TWO WAYS



IF THE DRIVE IS NOT THE LAST DRIVE IN THE CHAIN,  
NO TERMINATORS MUST BE INSTALLED

X4774

## 18.17. MICROPOLIS 1355

### 18.17.1. Characteristics Micropolis 1355

The Micropolis 1355 is a 170 Mbyte (unformatted) full height  $5\frac{1}{4}$ " hard disk drive which supports the Enhanced Small Device Interface (ESDI).

### 18.17.2. Connections Micropolis 1355

The drive is interfaced to the system via three connectors; a 34-way control signal connector, 20-way data transfer connector and a 4-way power connector.

Control Signal Connector J1

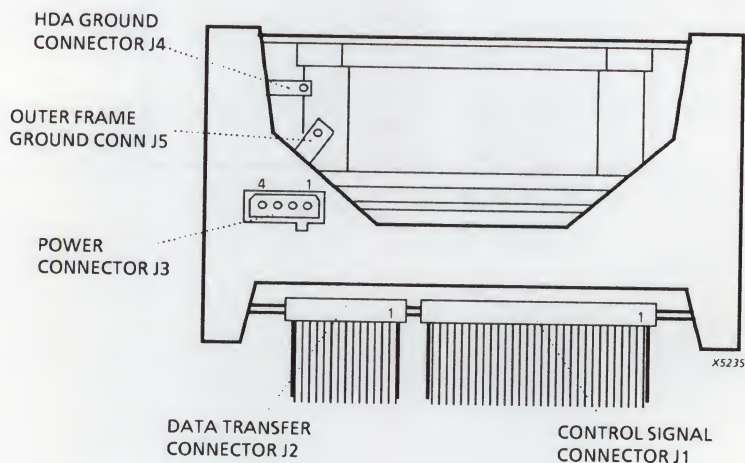
GROUND RETURN	SIGNAL	SIGNAL NAME
1	2	HEAD SELECT 3-N
3	4	HEAD SELECT 2-N
5	6	WRITE GATE-N
7	8	CONFIGURATION/STATUS-N
9	10	TRANSFER ACK-N
11	12	ATTENTION-N
13	14	HEAD SELECT 0-N
15	16	SECTOR-N ADDRESS MARK FOUND-N
17	18	HEAD SELECT 1-N
19	20	INDEX-N
21	22	READY-N
23	24	TRANSFER REQ-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	DRIVE SELECT 3-N
31	32	READ GATE-N
33	34	COMMAND-N

## Data Transfer Connector J2

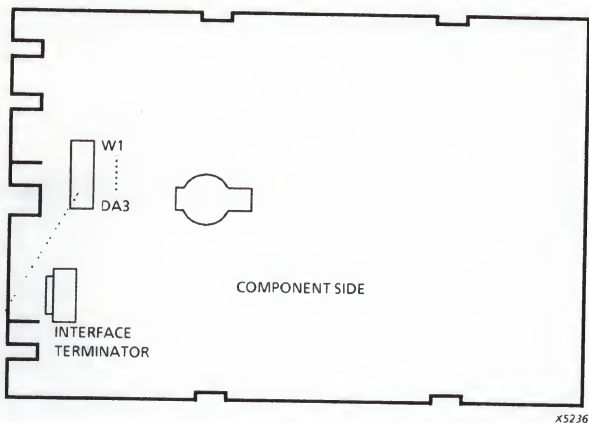
PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	DRIVE SELECTED-N	2	SECTOR-N ADDRESS MARK FOUND-N
3	COMMAND COMPLETE-N	4	ADDRESS MARK ENABLE-N
5	RESERVED	6	GROUND
7	+ WRITE CLOCK	8	- WRITE CLOCK
9	RESERVED	10	+ READ CLOCK
11	- READ CLOCK	12	GROUND
13	+ NRZ WRITE DATA	14	- NRZ WRITE DATA
15	GROUND	16	GROUND
17	+ NRZ READ DATA	18	- NRZ READ DATA
19	GROUND	20	INDEX-N

## Power Supply Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC



### 18.17.3. Strap Settings/Adjustments Micropolis 1355



SECTORING	
W1	FUNCTION
OUT	Hard Sector Mode*
IN	Soft Sector Mode

HARD SECTOR CONFIGURATIONS				
W4	W3	W2	SECTORS	BYTES SECTOR
OUT	OUT	OUT	35	512*
OUT	OUT	IN	63	256
OUT	IN	OUT	19	1024
OUT	IN	IN	9	2048
IN	OUT	OUT	5	4096
IN	OUT	IN	32	512
IN	IN	OUT	64	256
IN	IN	IN	1	20832

•	W1
•	W2
•	W3
•	W4
•	W5
•	DA1
•	DA2
•	DA3

DRIVE NUMBER			
DA3	DA2	DA1	DRIVE
OUT	OUT	IN	1*
OUT	IN	OUT	2
OUT	IN	IN	3
IN	OUT	OUT	4
IN	OUT	IN	5
IN	IN	OUT	6
IN	IN	IN	7

SPINDLE CONTROL	
W5	FUNCTION
OUT	Spindle motor starts at power on.*
IN	Spindle motor starts with interface 'start spindle' command.

\* DEFAULT SETTING

NOTE: W1 THRU W5 MAY BE OVERRULED BY SOFTWARE



### 18.17.5. Installation/Maintenance Micropolis 1355

To install the Micropolis 1355, perform the following procedure:-

- Verify that the correct strap selections have been made.
- Use the mounting screws supplied with the drive to mount the drive assembly.
- Connect the Control Signal Connector to J1, and Data Transfer cable to J2. Connect the power cable to J3.

Internal Memo  
For internal use only

PHILIPS  
Information Systems  
CDB90/135/  
department  
OFS

from  
A. Vermeulen

ext.  
055-432789

to  
Messrs.  
Dr. R.-I. Schwertner  
E. Klein  
K.-D. Diehl  
V. Wijermars  
P. Vis  
A. Vlaander  
G.J. Bruntink  
L. Alliki

department

Eiserfeld  
Eiserfeld  
Eiserfeld  
HD  
HD  
Sys Sup  
CS  
EMO

subject  
Problems with ESDI drives in Megadoc

date  
900507

IMPORTANT WARNING - ERROR

<sup>1355</sup>  
We had the problem that a 170MB ESDI FXD drive got completely haywire, even no formatting possible anymore. I just hear from Service that this caused by a mistake made in Montreal.

On the Adaptec ESDI controller, the small cable to the drive, sometimes pin 8 of the connector has been cut off and a notch is put in the cable connector.

THIS IS WRONG!

The connector on the card must be repaired / replaced and the notch removed from the cable connector.

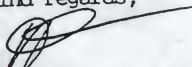
The problem occurred in a Megadoc Database Server P3360, but can happen in all P33xx/P91x5 systems that use the Adaptec ESDI controller. It shows only when the disk gets full.

I ask both Eiserfeld and Internal Service to check all P33xx/P91x5 systems with Adaptec controllers and ESDI drives and repair if necessary.

I hear that this problem is known by some people for some time, and that a Service Information is being made. I strongly demand that these kind of problems are communicated to the users of PCs as soon as they are known.

An official Change Request from Basic System will follow.

Kind regards,



Arjaen Vermeulen,  
dept. OFS.  
Philips Data Systems  
Apeldoorn.

THE UNIVERSITY OF CHICAGO  
LIBRARY

## 18.18. MICROPOLIS 1558-15

### 18.18.1. Characteristics Micropolis 1558-15

The Micropolis 1558-15 is a 382 Mbyte (unformatted) full height 5¼" hard disk drive which supports the Enhanced Small Device Interface (ESDI).

### 18.18.2. Connections Micropolis 1558-15

The drive is interfaced to the system via three connectors; a 34-way control signal connector, 20-way data transfer connector and a 4-way power connector.

#### Control Signal Connector J1

GROUND RETURN	SIGNAL	SIGNAL NAME
1	2	HEAD SELECT 3-N
3	4	HEAD SELECT 2-N
5	6	WRITE GATE-N
7	8	CONFIGURATION/STATUS-N
9	10	TRANSFER ACK-N
11	12	ATTENTION-N
13	14	HEAD SELECT 0-N
15	16	SECTOR-N ADDRESS MARK FOUND-N
17	18	HEAD SELECT 1-N
19	20	INDEX-N
21	22	READY-N
23	24	TRANSFER REQ-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	DRIVE SELECT 3-N
31	32	READ GATE-N
33	34	COMMAND-N

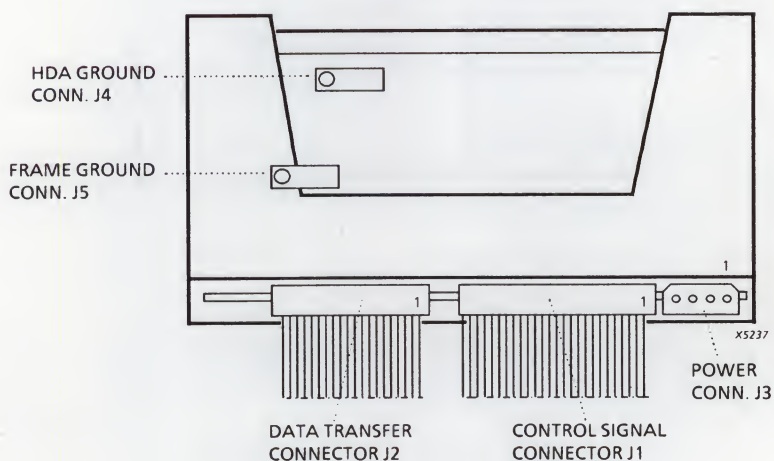


## Data Transfer Connector J2

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	DRIVE SELECTED-N	2	SECTOR-N ADDRESS MARK FOUND-N
3	COMMAND COMPLETE-N	4	ADDRESS MARK ENABLE-N
5	RESERVED	6	GROUND
7	+ WRITE CLOCK	8	- WRITE CLOCK
9	RESERVED	10	+ READ CLOCK
11	- READ CLOCK	12	GROUND
13	+ NRZ WRITE DATA	14	- NRZ WRITE DATA
15	GROUND	16	GROUND
17	+ NRZ READ DATA	18	- NRZ READ DATA
19	GROUND	20	INDEX-N

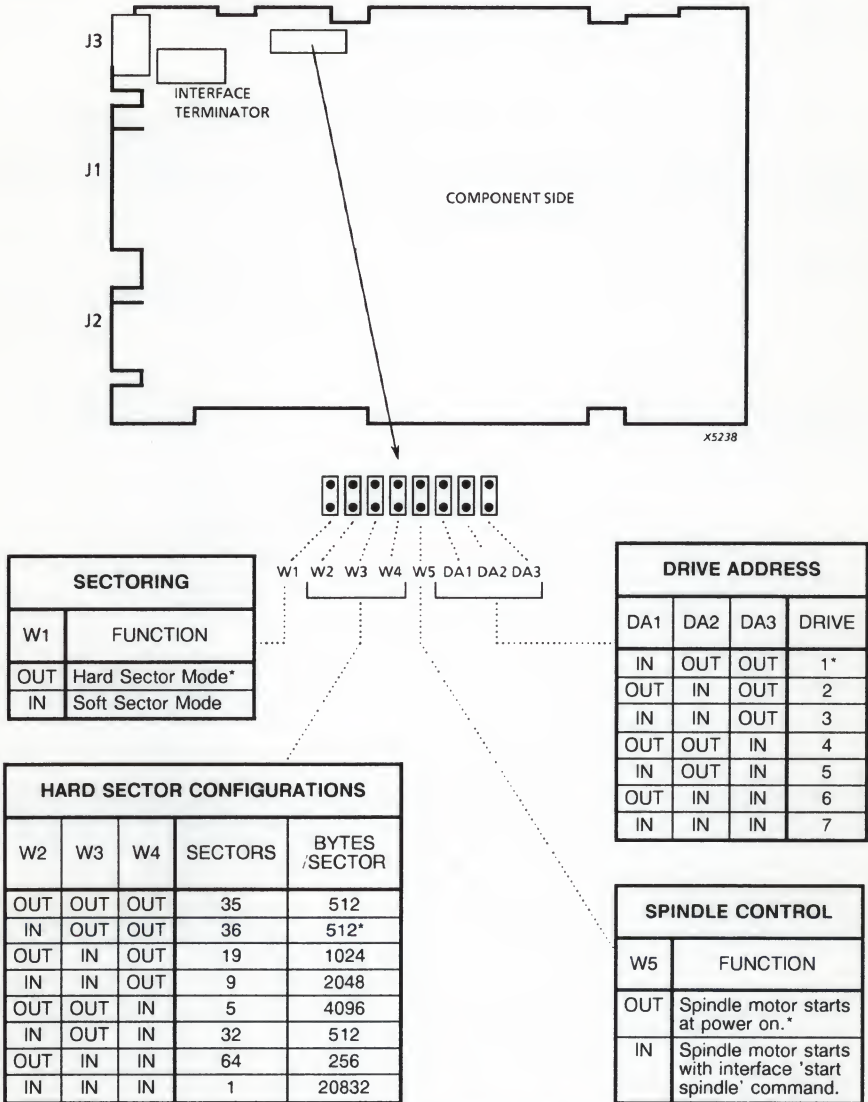
## Power Supply Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC





### 18.18.3. Strap Settings/Adjustments Micropolis 1558-15



\* DEFAULT SETTING

**NOTE: W1 THRU W5 MAY BE OVERRULED BY SOFTWARE**

### **18.18.5. Installation/Maintenance Micropolis 1558-15**

To install the Micropolis 1558-15, perform the following procedure:-

- Verify that the correct strap selections have been made.
- Use the mounting screws supplied with the drive to mount the drive assembly.
- Connect the Control Signal Connector to J1, and Data Transfer cable to J2. Connect the power cable to J3.

## 18.19. MICROPOLIS 1654-7

### 18.19.1. Characteristics Micropolis 1654-7

The Micropolis 1654-7 is a 182 Mbyte (unformatted) half height 5¼" hard disk drive which supports the Enhanced Small Device Interface (ESDI).

### 18.19.2. Connections Micropolis 1654-7

The drive is interfaced to the system via three connectors; a 34-way control signal connector, 20-way data transfer connector and a 4-way power connector.

Control Signal Connector J1

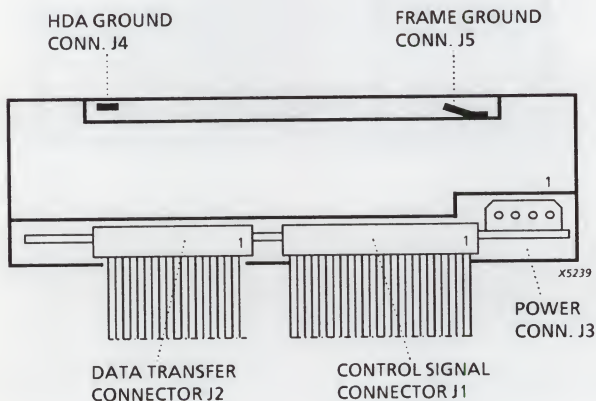
GROUND RETURN	SIGNAL	SIGNAL NAME
1	2	HEAD SELECT 3-N
3	4	HEAD SELECT 2-N
5	6	WRITE GATE-N
7	8	CONFIGURATION/STATUS-N
9	10	TRANSFER ACK-N
11	12	ATTENTION-N
13	14	HEAD SELECT 0-N
15	16	SECTOR-N ADDRESS MARK FOUND-N
17	18	HEAD SELECT 1-N
19	20	INDEX-N
21	22	READY-N
23	24	TRANSFER REQ-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	DRIVE SELECT 3-N
31	32	READ GATE-N
33	34	COMMAND-N

## Data Transfer Connector J2

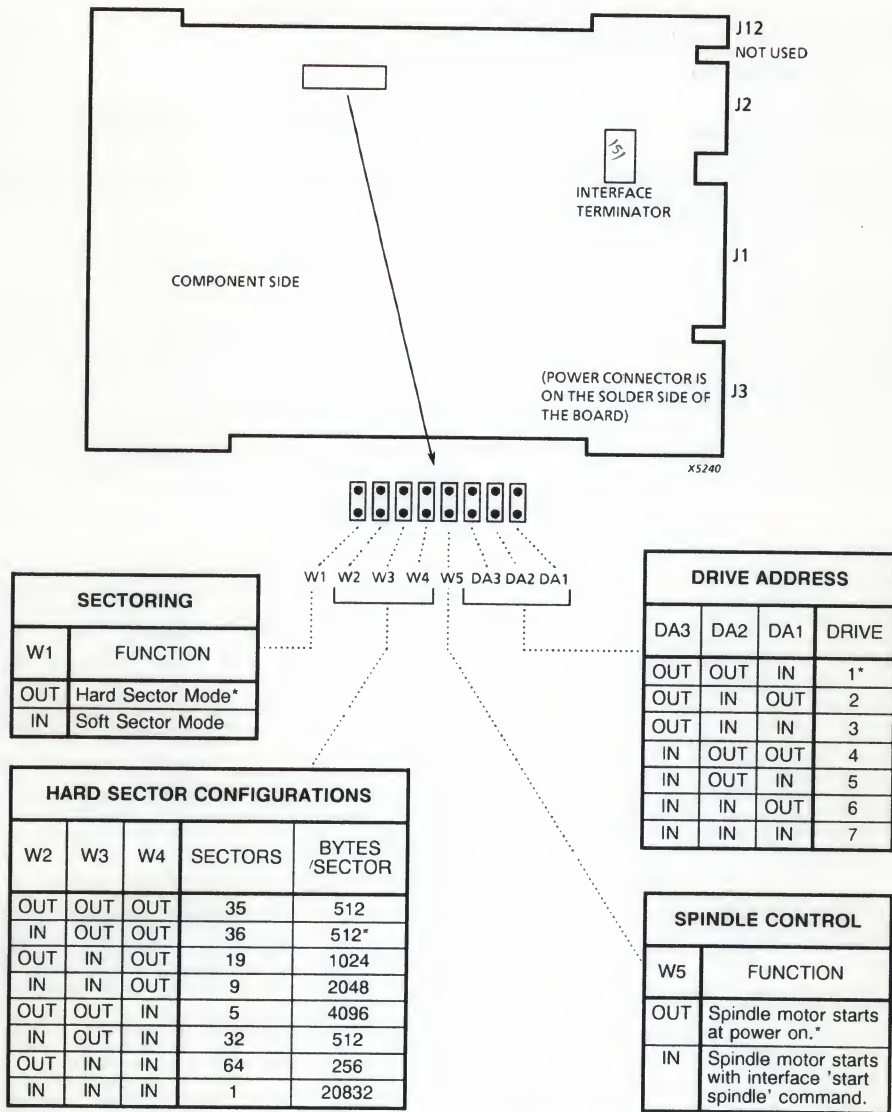
PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	DRIVE SELECTED-N	2	SECTOR-N ADDRESS MARK FOUND-N
3	COMMAND COMPLETE-N	4	ADDRESS MARK ENABLE-N
5	RESERVED	6	GROUND
7	+ WRITE CLOCK	8	- WRITE CLOCK
9	RESERVED	10	+ READ CLOCK
11	- READ CLOCK	12	GROUND
13	+ NRZ WRITE DATA	14	- NRZ WRITE DATA
15	GROUND	16	GROUND
17	+ NRZ READ DATA	18	- NRZ READ DATA
19	GROUND	20	INDEX-N

## Power Supply Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC



### 18.19.3. Strap Settings/Adjustments Micropolis 1654-7



\* DEFAULT SETTING

**NOTE: W1 THRU W5 MAY BE OVERRULED BY SOFTWARE**



### 18.19.5. Installation/Maintenance Micropolis 1654-7

To install the Micropolis 1654-7, perform the following procedure:-

- Verify that the correct strap selections have been made.
- Use the mounting screws supplied with the drive to mount the drive assembly.
- Connect the Control Signal Connector to J1, and Data Transfer cable to J2. Connect the power cable to J3.

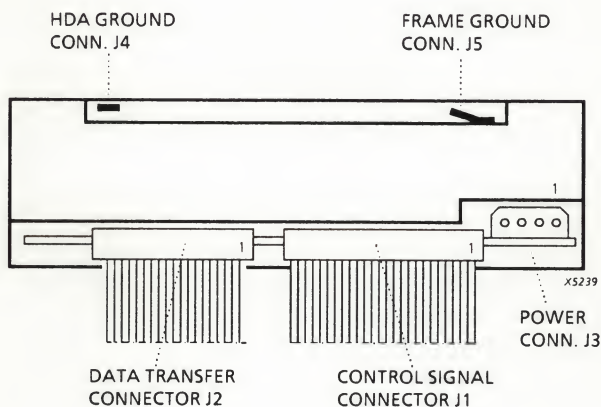
## 18.20. MICROPOLIS 1664-7

### 18.20.1. Characteristics Micropolis 1664-7

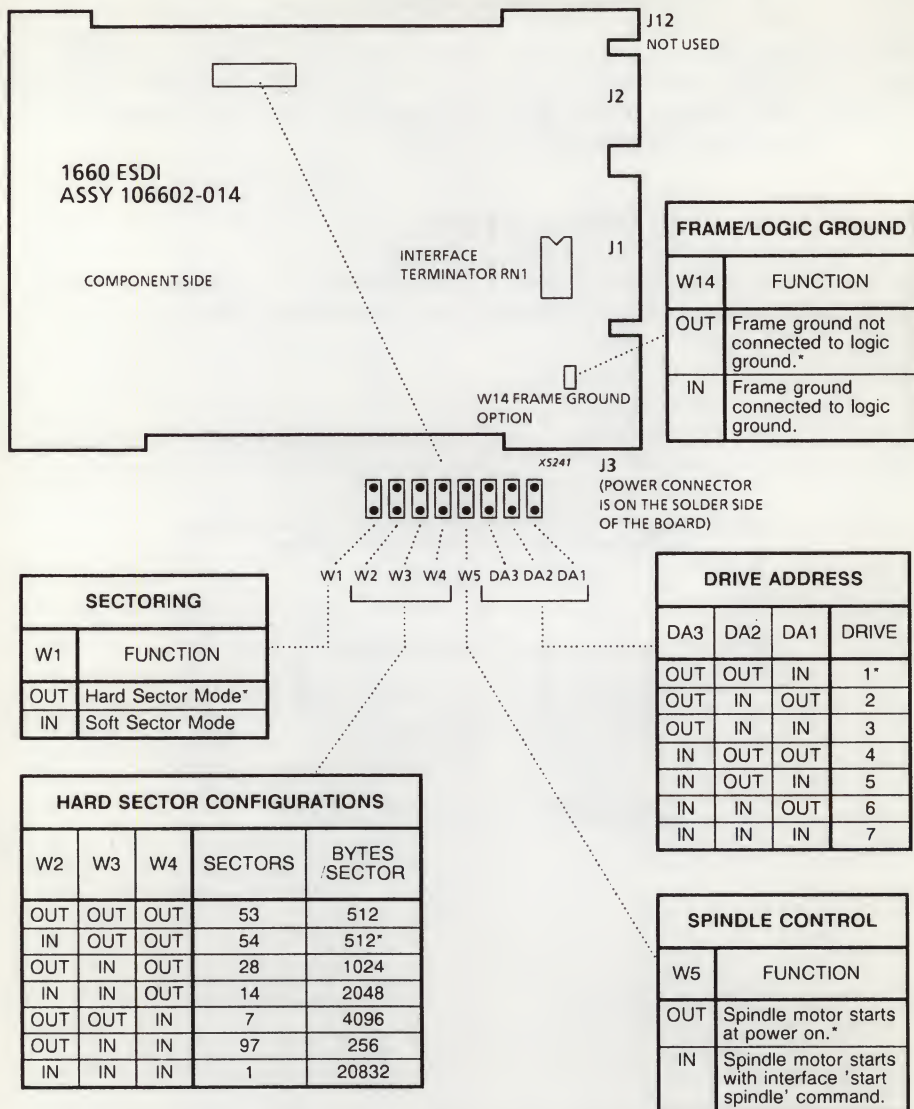
The Micropolis 1664-7 is a 389 Mbyte (unformatted) half height  $5\frac{1}{4}$ " hard disk drive which supports the Enhanced Small Device Interface (ESDI). The 1664-7 T-Cal is a compatible, later version of the 1664-7 with automatic temperature calibration. The 1664-7 T-Cal pcb layout is different.

### 18.20.2. Connections Micropolis 1664-7

The drive is interfaced to the system via three connectors; a 34-way control signal connector, 20-way data transfer connector and a 4-way power connector.



### 18.20.3. Strap Settings/Adjustments Micropolis 1664-7



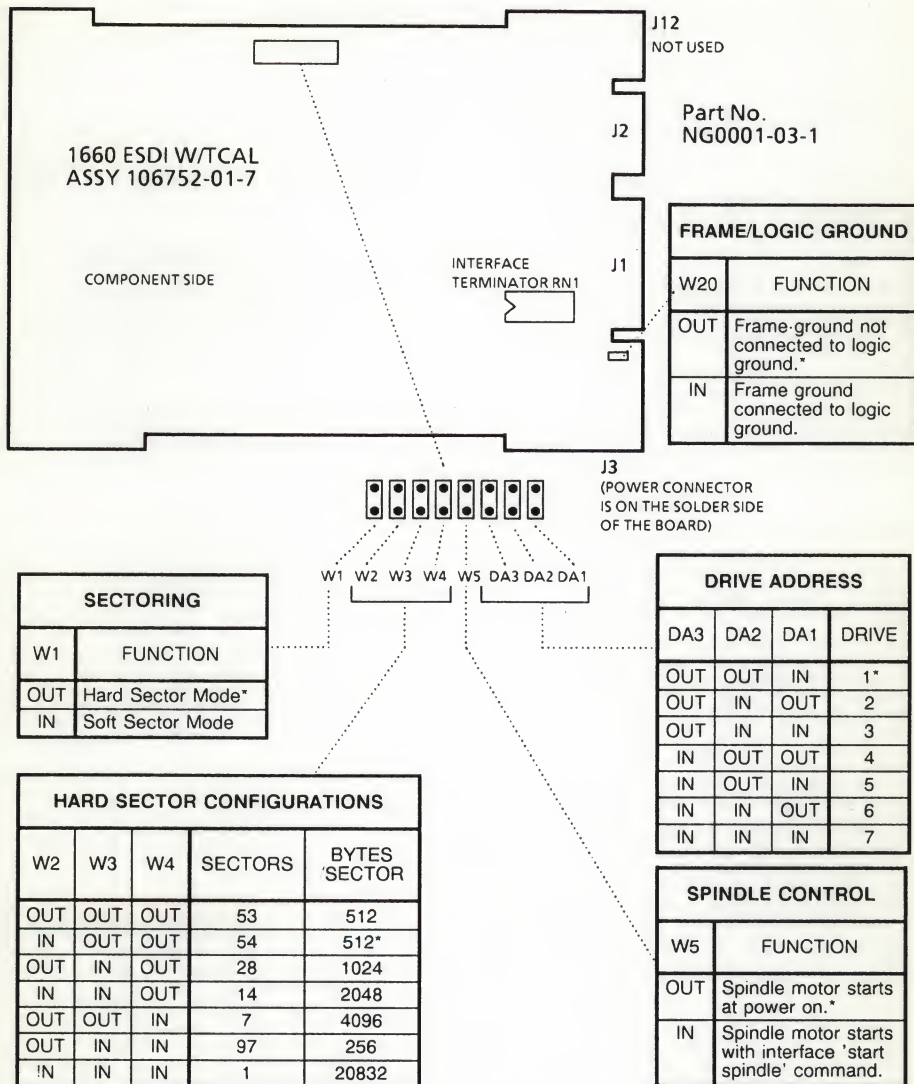
\* DEFAULT SETTING

**NOTE:** W1 thru W5 may be overruled by software

Do not change other straps then W1-W5, W14 and DA3-DA1 !!

For strapsetting of the 1664-7 T-Cal pcb see next page

# Strap Settings / Adjustments Micropolis 1664-7 T-Cal



**NOTE:** W1 thru W5 may be overruled by software

Do not change other straps then W1-W5, W20 and DA3-DA1 !!

\* DEFAULT SETTING

#### **18.20.4. Installation/Maintenance Micropolis 1664-7**

To install the Micropolis 1664-7, perform the following procedure:-

- Verify that the correct strap selections have been made.
- Use the mounting screws supplied with the drive to mount the drive assembly.
- Connect the Control Signal Connector to J1, and Data Transfer cable to J2. Connect the power cable to J3.



## 18.21. MINISCRIBE MS8225AT

### 18.21.1. Characteristics MiniScribe MS8225AT

The MiniScribe MS8225AT is a one-platter 20 Mbyte  $3\frac{1}{2}$ " hard disk drive with embedded controller for use with PC/AT compatible systems. Systems that do not support address decoding and buffering must use the MiniScribe AT-adaptor board or compatible.

The drive is mounted internally within the chassis of the system unit, with the activity LED brought out to the front bezel. This LED is used to indicate drive activity, and also to display 'Error codes', if a fault should occur.

### 18.21.2. Connections MiniScribe MS8225AT

The drive is interfaced to the system via two connectors, a 40-conductor ribbon cable responsible for drive control and data transmission, and a 4-pin power connector. Frame grounding is provided by the chassis mounting.

Control / Data Connector J1

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	RESET	21	N.C.
2	GROUND	22	GROUND
3	DATA BIT 7	23	I/O WR -N
4	DATA BIT 8	24	GROUND
5	DATA BIT 6	25	I/O RD -N
6	DATA BIT 9	26	GROUND
7	DATA BIT 5	27	I/OCHRDY
8	DATA BIT 10	28	ALE
9	DATA BIT 4	29	N.C.
10	DATA BIT 11	30	GROUND
11	DATA BIT 3	31	IRQ
12	DATA BIT 12	32	HIO16 -N
13	DATA BIT 2	33	HA1
14	DATA BIT 13	34	PDIAG -N
15	DATA BIT 1	35	HA0
16	DATA BIT 14	36	HA2
17	DATA BIT 0	37	CS0 -N
18	DATA BIT 15	38	CS1 -N
19	GROUND	39	ACTIVE -N
20	KEY	40	GROUND

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

### 18.21.3. Strap Settings / Adjustments MiniScribe MS8225AT

There are thirteen jumper positions on the Miniscribe MS8225AT drive, only jumper eleven (11) must be present. This jumper ensures that the IOCHRDY line is used with disk or I/O operations.

All other jumpers must not be installed, they are meant for dual drive configurations and for factory use only.

### 18.21.5. Installation / Maintenance MiniScribe MS8225AT

To take full advantage of the shock mounts, it is necessary to provide a minimum of 0.1" clearance on both the top and sides of the drive. This clearance allows for movement of the drive during acceleration. The drive may be mounted in any attitude. Mounting is done using 6-32 screws, 1/8" maximum penetration. Adequate ventilation must be given to the drive to ensure reliable operation over the operating temperature range.

### 18.21.6. Diagnostic Functions MiniScribe MS8225AT

The microprocessor on the MS8225AT performs a series of tests during power-up, and then monitors the drive during use. Should a fault condition be detected, the microprocessor indicates the fault type by flashing a code on the activity LED mounted on the front bezel of the PC.

Fault codes are in the form of 4 bit binary numbers which are transmitted most significant bit first. The codes will be repeated until the drive power has been reset. A continuous 0.5s of the activity LED represents a binary 1, and flashing for 0.5s represents a 0. Bits are separated by 0.3s off, and cycles of a complete number by 1.0s off. For example, flash, continuous, flash, continuous, = 0101 = code 5.

## MS8225AT Fault Codes

Code 0	(0000)	Microprocessor RAM error.
Code 1	(0001)	Not used.
Code 2	(0010)	Not used.
Code 3	(0011)	Write Fault latch will not reset.
Code 4	(0100)	Index pulse not detected during motor spin-up.
Code 5	(0101)	Motor unable to reach 3600 rpm in 800 revolutions.
Code 6	(0110)	Unable to stabilize rotational speed in 10 seconds.
Code 7	(0111)	Rotational speed not within 0.5% tolerance.
Code 8	(1000)	Unable to uncover track 000 sensor.
Code 9	(1001)	Unable to cover track 000 sensor.
Code A	(1010)	Track 000 interrupter misadjusted.
Code B	(1011)	Shipping zone error, crash stop misadjusted.
Code C	(1100)	Not used.
Code D	(1101)	Seek error during burn-in or recalibration.
Code E	(1110)	No motor hall sensor transitions during spin-up.
Code F	(1111)	Unexpected interrupt from microprocessor.

If a fault code is indicated each time power is applied, replace the drive. If fault code 9 is indicated, check that sunlight is not interfering with the track 000 optical sensor.





## 18.22. WESTERN DIGITAL 93028/93038/93048-X

### 18.22.1. Characteristics Western Digital 93028/93038/93048-X

The Western Digital 93028/93038/93048-X are 3.5" hard disk drives incorporating the IDE interface with embedded controller.

The 93028-X is a 20 MB hard disk with two read/write heads, the 93038-X is a 30 MB hard disk with three read/write heads, the 93048-X is a 40 MB hard disk with four read/write heads.

### 18.22.2. Connections Western Digital 93028/93038/93048-X

The drive is interfaced to the system via three connectors; a 40-way interface connector, 2-way LED connector and a 4-way power connector.

Host Interface (IDE) Connector J2

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	RST-N	21	AEN
2	GND	22	GND
3	SD7	23	IOW-N
4	GND	24	GND
5	SD6	25	IOR-N
6	GND	26	GND
7	SD5	27	DACK-N
8	GND	28	GND
9	SD4	29	DRQ
10	GND	30	GND
11	SD3	31	IRQ
12	GND	32	GND
13	SD2	33	SA1
14	GND	34	Reserved
15	SD1	35	SA0
16	GND	36	GND
17	SD0	37	CS-N
18	GND	38	GND
19	GND	39	ACTIVE-N
20	Key	40	GND



## Power Supply Connector J1

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC

## LED Activity Indicator Connector J6

PIN No.	SIGNAL NAME
1	ACTIVE-N
2	R5V

# 18.22.3. Strap Settings/Adjustments Western Digital 93028/93038/93048-X

## DATA FIELDS DURING FORMAT

4 ● FILLED WITH FFH  
3 ● (USED FOR FAST FORMAT)

4 ● WRITTEN FROM \*  
3 ● SECTOR BUFFER

## SHORT TERM BURN-IN

6 ● ACTIVE  
5 ●

6 ● NOT ACTIVE \*  
5 ●

## RETRIES

● ● DISABLED  
3 5

● ● ENABLED \*  
3 5

## TRANSLATION

2 ● DISABLED  
1 ●

2 ● ENABLED \*  
1 ●

\* DEFAULT SETTING

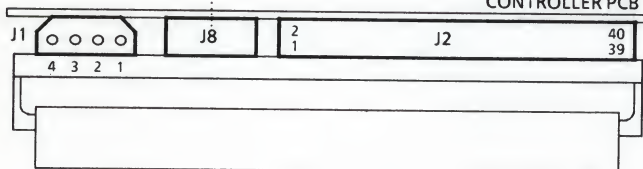
## LONG TERM BURN-IN

● ● ● ACTIVE  
1 3 5

● ● ● NOT ACTIVE \*  
1 3 5

2 4 6  
● ● ●  
● ● ●  
1 3 5

## CONTROLLER PCB



X5242

### **18.22.5. Installation/Maintenance Western Digital 93028/93038/93048-X**

To install the 93028/93038/93048-X perform the following procedure:

- Verify that the correct strap selection has been made on J8, for normal operation no straps are required on J8. To invoke one of the diagnostic modes, J8 must be strapped, refer to 18.22.6.
- Use the mounting screws supplied with the drive to mount the drive assembly in the PC (use the correct screws as screws that are too long will incorrectly ground the casting)
- Connect the host interface cable to J2, LED indicator cable to the LED assembly and power cable to J1.

### **18.22.6. Diagnostic Functions Western Digital 93028/93038/93048-X**

The 93028/93038/93048-X have a 6-pin vertical header connector J8 which can be used to start two self tests. These are as follows:

#### **Short Term Burn-in (Pins 5 and 6 shorted together)**

When pins 5 and 6 are shorted together, the drive goes into a short term burn-in loop following a reset or after power-on (the drive does not accept any commands during this time). The short term burn-in comprises a repeatable loop performing the following tests:

- ROM checksum verification
- Sector buffer RAM test
- WD42C22 register test
- Microprocessor internal RAM test
- Format and scan ID on cylinder 782 (all heads)
- Speed verification
- Servo burst test
- Stepper motor test

If any of the tests fail, or if the strap is removed, the heads are parked and the drive idles with the indicator LED switched off.

### **Long Term Burn-in (Pins 1, 3 and 5 shorted together)**

When pins 1, 3 and 5 are shorted together, the drive goes into a long term burn-in loop following a reset or after power-on (the drive does not accept any commands during this time).

**Caution:** *When this jumper is installed, the drive is formatted and ALL data is lost (this option should not normally be invoked except at the factory).*

The long term burn-in first parks the heads, formats the disk then performs various I/O read/write operations to determine any media defects. If any of the tests fail, or if the strap is removed, the heads are parked and the drive idles with the indicator LED switched off.





## 18.23. RODIME 3058A/3088A/3128A

### 18.23.1. Characteristics Rodime 3058A/3088A/3128A

The Rodime 3058A/3088A/3128A are 3.5" hard disk drives with embedded controllers incorporating a customized PC/AT interface. They have two, three and four disks respectively, and provide fast data storage and access.

### 18.23.2. Connections Rodime 3058A/3088A/3128A

The drive is interfaced to the system via two connectors: a 40-way data control connector, and a 4-way power connector.

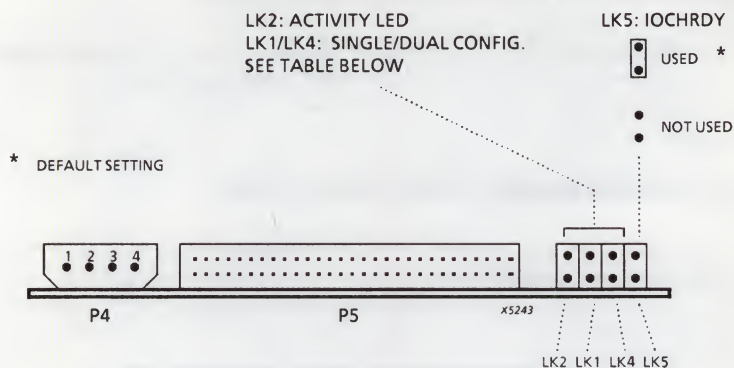
Host Interface Connector P5

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	RESET-N	21	RESERVED
2	GROUND	22	GROUND
3	DATABIT 7	23	IOW-N
4	DATABIT 8	24	GROUND
5	DATABIT 6	25	IOR-N
6	DATABIT 9	26	GROUND
7	DATABIT 5	27	IOCHRDY
8	DATABIT 10	28	RESERVED
9	DATABIT 4	29	RESERVED
10	DATABIT 11	30	GROUND
11	DATABIT 3	31	IRQ14
12	DATABIT 12	32	IO16-N
13	DATABIT 2	33	SA1
14	DATABIT 13	34	PDIAG-N
15	DATABIT 1	35	SA0
16	DATABIT 14	36	SA2
17	DATABIT 0	37	CS0-N
18	DATABIT 15	38	CS1-N
19	GROUND	39	LED-N SLAVE-N
20	KEY	40	GROUND

Power Supply Connector P4

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC

### 18.23.3. Strap Settings/Adjustments Rodime 3058A/3088A/3128A



FUNCTION	LK1	LK2	LK4
MASTER, SINGLE DRIVE WITH LED ON INTERFACE	OUT	IN	IN
MASTER, SINGLE DRIVE NO LED ON INTERFACE	OUT	OUT	IN
MASTER, DUAL DRIVE NO LED ON INTERFACE	IN	OUT	IN
SLAVE, DUAL DRIVE NO LED ON INTERFACE	OUT	OUT	OUT
MASTER, DUAL DRIVE WITH LED ON INTERFACE	IN	IN	IN
SLAVE, DUAL DRIVE WITH LED ON INTERFACE	OUT	IN	OUT

### 18.23.5. Installation/Maintenance Rodime 3058A/3088A/3128A

To install the Rodime 3058A/3088A/3128A, perform the following procedure:

- Verify that the correct strap selections have been made;
- Use the mounting screws supplied with the drive to mount the drive assembly in the PC;
- Connect the host interface cable to P5, and the power cable to P4.

### 18.23.6. Diagnostic Functions Rodime 3058A/3088A/3128A

The microprocessor on the Rodime 3058A/3088A/3128A performs a series of tests during power-up, and then monitors the drive during use. Should a fault condition be detected, the microprocessor indicates the fault type by flashing a code on the red LED mounted on the front panel, and shuts down the spindle motor.

Fault codes are in the form of 4-bit binary numbers which are transmitted with the most significant bit first. The codes will be repeated until the drive power has been reset. A long flash represents a logical '1', and a short flash a logical '0'.

For example: long, short, short, short = 1000 = code 8.

The following codes may be indicated: 6,7,8,A,B and C. The meaning of these codes is detailed below.

Code 6	(0110):	Unable to achieve correct track zero status.
Code 7	(0111):	Spindle motor did not start at power up.
Code 8	(1000):	Spindle motor speed check failed.
Code A	(1010):	No track crossing signal during seek.
Code B	(1011):	No servo data.
Code C	(1100):	+ 12V power supply failure.



## 18.24. CONNOR CP3104/CP3204

### 18.24.1. Characteristics Connor CP3104/CP3204

The Connor CP3104/CP3204 are 3.5" hard disk drives incorporating the IDE interface with embedded controller.

The CP3104 is a 104 Mbyte drive with 8 read/write heads, the CP3204 is a 212 Mbyte drive with 8 read/write heads. Both the CP3104/CP3204 are autoparking drives, at power-off.

### 18.24.2. Connections Connor CP3104/CP3204

The drive is interfaced to the system via three connectors; a 40-pin interface connector, a 14-pin LED and I/O connector and a 4-pin power connector.

Host Interface (IDE) Connector J2

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	RST-N	21	Reserved
2	GND	22	GND
3	SD7	23	IOW-N
4	SD8	24	GND
5	SD6	25	IOR-N
6	SD9	26	GND
7	SD5	27	Reserved
8	SD10	28	ALE
9	SD4	29	Reserved
10	SD11	30	GND
11	SD3	31	IRQ14
12	SD12	32	IOCS16-N
13	SD2	33	SA1
14	SD13	34	HPDIAG-N
15	SD1	35	SA0
16	SD14	36	SA2
17	SD0	37	CS0-N
18	SD15	38	CS1-N
19	GND	39	HTSLV/ACTIVE-N
20	Key	40	GND



Power Supply Connector J3 on CP3104; J4 on CP3204

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	GND
3	GND
4	+ 5 VDC

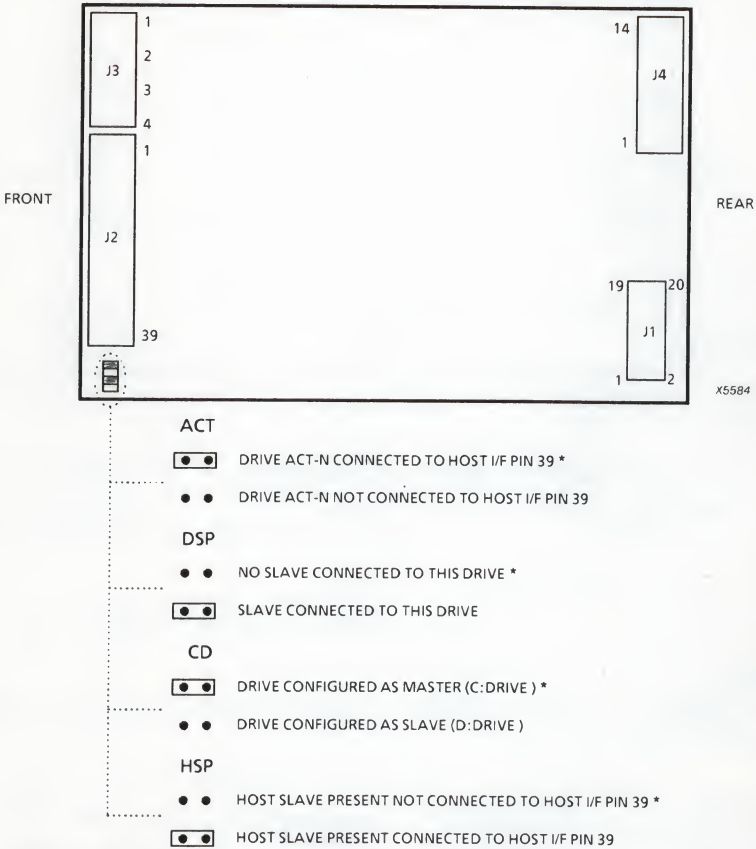
LED Activity Indicator and I/O Connector J4 on CP3104; J1 on CP3204

PIN No.	SIGNAL NAME
1	ACTIVE-N
2	R5V
3	Not connected
4	Not connected
5	Reserved
6	Reserved
7	Reserved
8	Reserved
9	Reserved
10	Reserved
11	Reserved
12	Reserved
13	Reserved
14	Not connected

One other connector is present on these drives; J1 on the CP3104 and J3 on the CP3204. These connectors connect the hard disk controller logic on the drive to the head disk assembly unit, there signal descriptions are not known at the time of writing.

18.24.3. Strap Settings/Adjustments Connor CP3104/CP3204

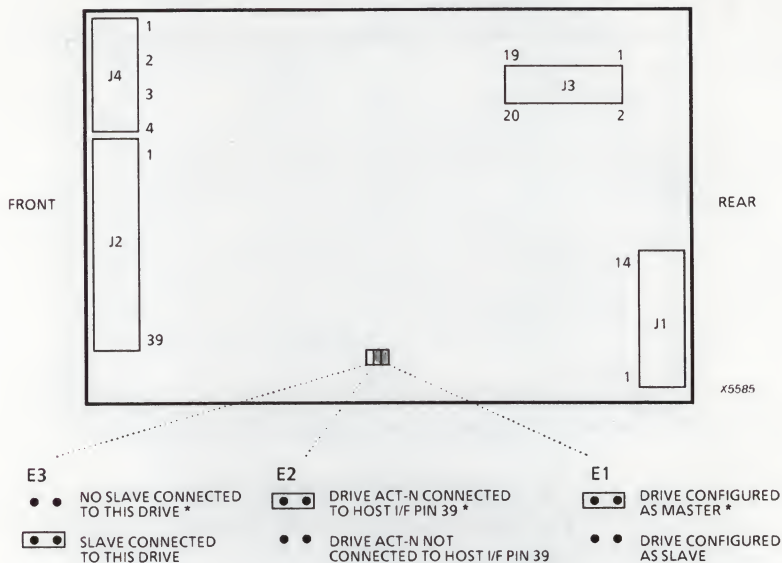
Strap Settings Connor CP3104



The four straps on the drive are used to configure the drive in one of three modes, as detailed below.

JUMPER	SINGLE DRIVE MASTER (DEFAULT)	DUAL DRIVE MASTER	DUAL DRIVE SLAVE
ACT	IN	IN	OUT
CD	IN	IN	OUT
HSP	OUT	OUT	IN
DSP	OUT	IN	OUT

Strap Settings Connor CP3204



The three straps on the drive are used to configure the drive in one of three modes, as detailed below.

JUMPER	SINGLE DRIVE MASTER (DEFAULT)	DUAL DRIVE MASTER	DUAL DRIVE SLAVE
E1	IN	IN	OUT
E2	IN	OUT	OUT
E3	OUT	IN	IN

### **18.24.5. Installation/Maintenance Connor CP3104/CP3204**

To install the Connor CP3104/CP3204 perform the following procedure:

- Verify that the correct strap selections have been made on the drive (refer to 18.24.3.). When installing the drive in a P3350, ensure that strap JP11 on the system board is installed in the 1-2 position.
- Use the mounting screws supplied with the drive to mount the drive assembly in the system.
- Connect the host interface cable to J2, LED indicator cable to the LED connector and power cable to the power connector.





## 18.25. MINISCRIBE 8051A

### 18.25.1. Characteristics Miniscribe 8051A

The Miniscribe 8051A is a 3.5" hard disk drive incorporating the IDE interface with embedded controller.

The Miniscribe 8051A is a 42 Mbyte drive with 4 read/write heads. The Miniscribe 8051A autoparks at power-off.

### 18.25.2. Connections Miniscribe 8051A

The drive is interfaced to the system via three connectors; a 40-pin interface connector, a 2-pin LED connector and a 4-pin power connector.

Host Interface (IDE) Connector J1

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	RST	21	Reserved
2	GND	22	GND
3	SD7	23	IOW-N
4	SD8	24	GND
5	SD6	25	IOR-N
6	SD9	26	GND
7	SD5	27	IOCHRDY
8	SD10	28	ALE
9	SD4	29	Reserved
10	SD11	30	GND
11	SD3	31	IRQ14
12	SD12	32	IOCS16-N
13	SD2	33	SA1
14	SD13	34	HPDIAG-N
15	SD1	35	SA0
16	SD14	36	SA2
17	SD0	37	CS0-N
18	SD15	38	CS1-N
19	GND	39	ACTIVE-N
20	Key	40	GND

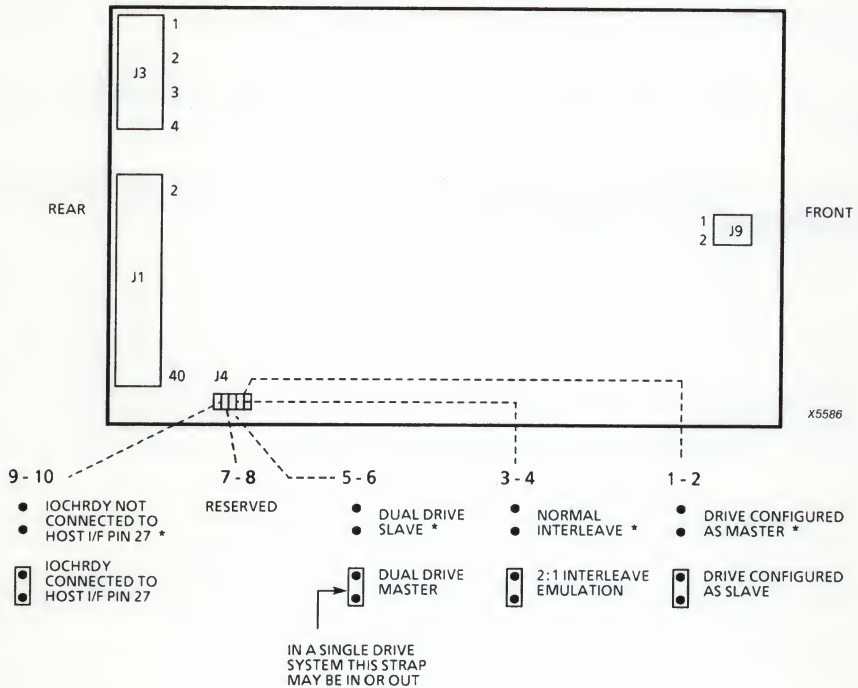
## Power Supply Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	GND
3	GND
4	+ 5 VDC

## LED Activity Indicator Connector J9

PIN No.	SIGNAL NAME
1	ACTIVE-N
2	R5V

### 18.25.3. Strap Settings/Adjustments Miniscribe 8051A



NOTE: \* INDICATES DEFAULT

### **18.25.5. Installation/Maintenance Miniscribe 8051A**

To install the Miniscribe 8051A perform the following procedure:

- Verify that the correct strap selections have been made on the drive (refer to 18.25.3.).
- Use the mounting screws supplied with the drive to mount the drive assembly in the system.
- Connect the host interface cable to J1, LED indicator cable to the hard disk activity LED and power cable to the power connector J3.

## 18.26. SEAGATE ST125A/ST157A

### 18.26.1. Characteristics Seagate ST125A/ST157A

The Seagate ST125A/ST157A are 3.5" hard disk drives incorporating the IDE interface with embedded controller.

The Seagate ST125A is a 21 Mbyte drive with 4 read/write heads, the Seagate ST157A is a 42 Mbyte drive with 6 read/write heads. The ST125A/ST157A autopark at power-off.

### 18.26.2. Connections Seagate ST125A/ST157A

The drive is interfaced to the system via three connectors; a 40-pin interface connector, a 2-pin LED connector and a 4-pin power connector.

Host Interface (IDE) Connector J1

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	RST-N	21	Reserved
2	GND	22	GND
3	SD7	23	IOW-N
4	SD8	24	GND
5	SD6	25	IOR-N
6	SD9	26	GND
7	SD5	27	Reserved
8	SD10	28	ALE
9	SD4	29	Reserved
10	SD11	30	GND
11	SD3	31	IRQ14
12	SD12	32	IOCS16-N
13	SD2	33	SA1
14	SD13	34	HPDIAG-N
15	SD1	35	SA0
16	SD14	36	SA2
17	SD0	37	CS0-N
18	SD15	38	CS1-N
19	GND	39	HTSLV/ACTIVE-N
20	Key	40	GND



### Power Supply Connector J3

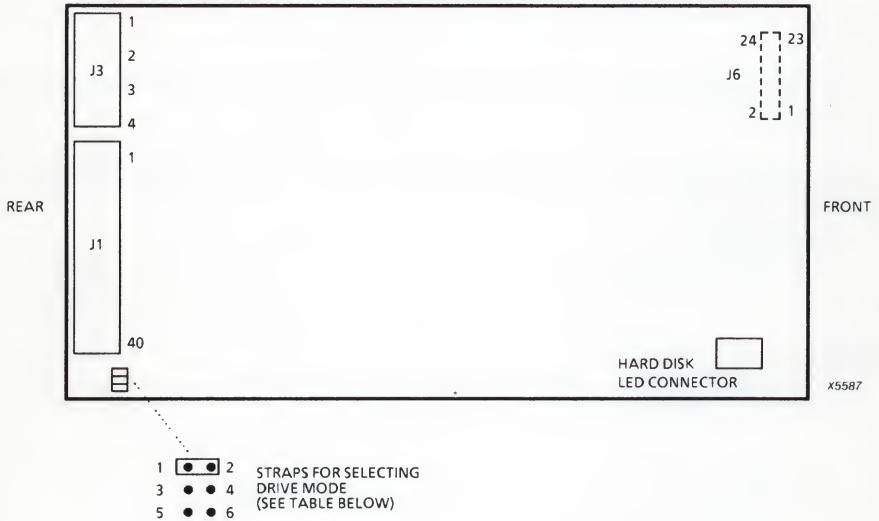
PIN No.	SIGNAL NAME
1	+ 12 VDC
2	GND
3	GND
4	+ 5 VDC

### LED Activity Indicator Connector

PIN No.	SIGNAL NAME
1	ACTIVE-N
2	R5V

One other connector is present on these drives; J6 which connects the hard disk controller logic on the drive to the head disk assembly unit, the signal descriptions are not known at the time of writing.

### 18.26.3. Strap Settings/Adjustments Seagate ST125A/ST157A



The three straps on the drive are used to configure the drive in one of three modes, as detailed below.

JUMPER	SINGLE DRIVE MASTER (DEFAULT)	DUAL DRIVE MASTER	DUAL DRIVE SLAVE
1-2	IN	IN	OUT
3-4	OUT	IN	IN
5-6	OUT/extra LED	OUT	OUT

### 18.26.5. Installation/Maintenance Seagate ST125A/ST157A

To install the Seagate ST125A/ST157A perform the following procedure:

- Verify that the correct strap selections have been made on the drive (refer to 18.26.3.).
- Use the mounting screws supplied with the drive to mount the drive assembly in the system.
- Connect the host interface cable to J1, LED indicator cable to the LED and power cable to the power connector J3.



system series: P3000

model: P3230  
P3345main assy:  
ST157A HDD

nr: P3000-165

date: 15-9-1989 revised:

title: Introduction of Seagate ST157A HDD.

## note:

The Seagate ST157A 3.5" hard disk drive has a formatted capacity of 42MB and supports the AT interface. The head positioner uses a stepper motor, with microsteps for track centre positioning, using data from an embedded servo. There is no dedicated servo surface. The -1 version of the drive is used, with an average seek time of 28 ms. The drives are to be used in the P3230 and P3345 systems.

At power down, the heads will move to the landing zone.

The drive can be used in the native mode, with physical parameters of 6 heads, 26 sectors/track and 539 cylinders, or in a translated mode, in which it appears to the host to have 5 heads, 17 sectors and 977 cylinders. The mode is commanded at the interface.

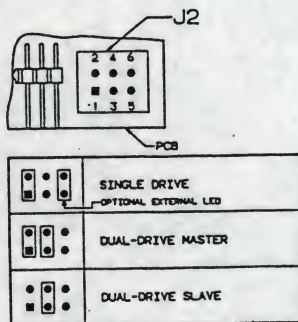


Fig.1 User selectable jumpers

User jumper options are shown in Fig.1. Pins 1-2 should be jumpered for single drive. The drive can be mounted vertically on either side, or horizontally with the PCB underneath.

The drive can be obtained from Concern Service and has a service 12NC of 5322 218 80704. It is completely compatible with the Miniscribe 8051A.

Responsibility: C. Keatinge

page 1 of 1

*Chris Keatinge*

1. The first part of the report deals with the general situation of the country and the progress of the work during the year. It is a summary of the work done and the results obtained. It is a general statement of the work done and the results obtained.

2. The second part of the report deals with the details of the work done and the results obtained. It is a detailed statement of the work done and the results obtained.

Item	Quantity	Value
1. Materials	100	100
2. Labor	200	200
3. Other	50	50
Total	350	350

3. The third part of the report deals with the financial statement of the work done and the results obtained. It is a financial statement of the work done and the results obtained.



## 18.27. MICROPOLIS 1588-15

### 18.27.1. Characteristics Micropolis 1588-15

The Micropolis 1588-15 is a 765 Mbyte (unformatted)  $5\frac{1}{4}$ " full height Winchester hard disk drive which supports the Small Computer System Interface (SCSI).

### 18.27.2. Connections Micropolis 1588-15

The drive is interfaced to the system via SCSI connector (J1):

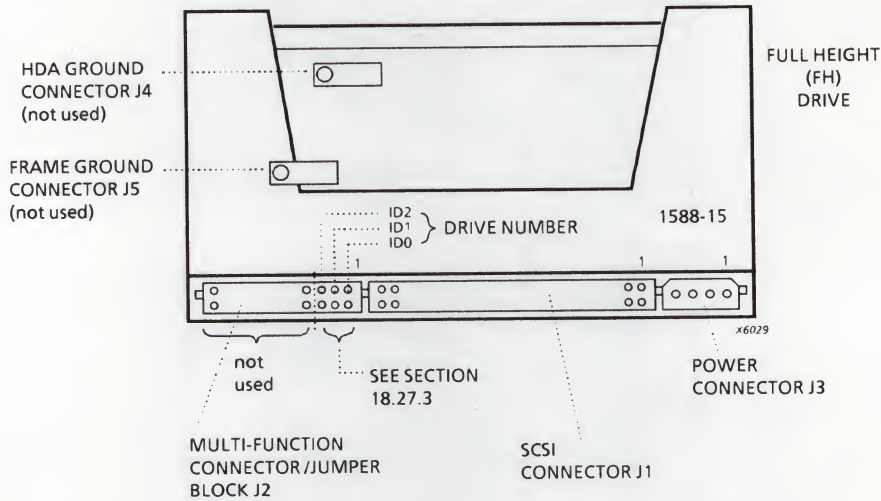
GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	DATABUS0-N
3	4	DATABUS1-N
5	6	DATABUS2-N
7	8	DATABUS3-N
9	10	DATABUS4-N
11	12	DATABUS5-N
13	14	DATABUS6-N
15	16	DATABUS7-N
17	18	DATABUS PARITY-N
19	20	GROUND
21	22	GROUND
23	24	GROUND
*	26	TERMINATOR POWER**
27	28	GROUND
29	30	GROUND
31	32	ATTENTION-N
33	34	GROUND
35	36	BUSY-N
37	38	ACKNOWLEDGE-N
39	40	RESET-N
41	42	MESSAGE-N
43	44	SELECT-N
45	46	CONTROL DATA-N
47	48	REQUEST-N
49	50	INPUT/OUTPUT-N

\* pin 25 should be left open

\*\* optional +5VDC, if strap W2 is connected

Power Supply Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC



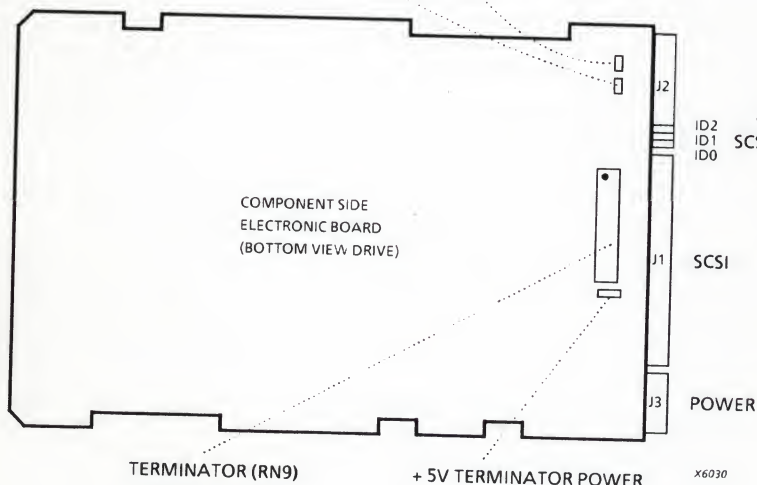
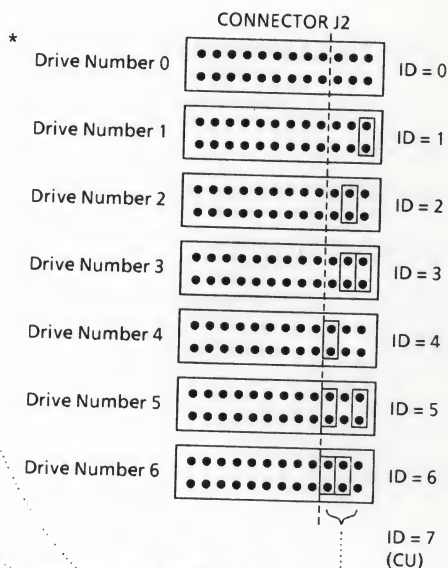
# 18.27.3. Strap Settings/Adjustments Micropolis 1588-15

## SPINDLE CONTROL (W5)

- \* ☐ SPINDLE MOTOR STARTS AT POWER-ON
- ☐ SPINDLE MOTOR STARTS AT START UNIT COMMAND

## SCSI BUS PARITY CHECK (W4)

- \* ☐ PARITY CHECK
- ☐ NO PARITY CHECK



## TERMINATOR (RN9)

SCSI TERMINATOR ONLY MOUNTED IF DRIVE IS THE LAST ONE IN THE CHAIN

## + 5V TERMINATOR POWER

- W1 ☐ ☐ FROM DRIVE \*
- W2 ☐ ☐ FROM CONTROL UNIT

X6030

### 18.27.5. Installation/Maintenance Micropolis 1588-15

To install the Micropolis 1588-15, perform the following procedure:

- Verify that the correct strap selections have been made (see section 18.27.3.).
- Verify that the terminator RN9 is mounted if the drive is the last device on the SCSI chain.
- Mount the mechanical brackets with 2 screws onto the drive.
- Mount the drive into the cabinet (4 screws).
- Connect the SCSI flat cable to connector J1, and the power cable to J3.

## 18.28. MICROPOLIS 1684-7

### 18.28.1. Characteristics Micropolis 1684-7

The Micropolis 1684-7 is a 389.3 Mbyte (unformatted)  $5\frac{1}{4}$ " half-height Rigid hard disk drive which supports the Small Computer System Interface (SCSI).

### 18.28.2. Connections Micropolis 1684-7

The drive is interfaced to the system via SCSI connector (J1):

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	DATABUS0-N
3	4	DATABUS1-N
5	6	DATABUS2-N
7	8	DATABUS3-N
9	10	DATABUS4-N
11	12	DATABUS5-N
13	14	DATABUS6-N
15	16	DATABUS7-N
17	18	DATABUS PARITY-N
19	20	GROUND
21	22	GROUND
23	24	GROUND
*	26	TERMINATOR POWER**
27	28	GROUND
29	30	GROUND
31	32	ATTENTION-N
33	34	GROUND
35	36	BUSY-N
37	38	ACKNOWLEDGE-N
39	40	RESET-N
41	42	MESSAGE-N
43	44	SELECT-N
45	46	CONTROL DATA-N
47	48	REQUEST-N
49	50	INPUT OUTPUT-N

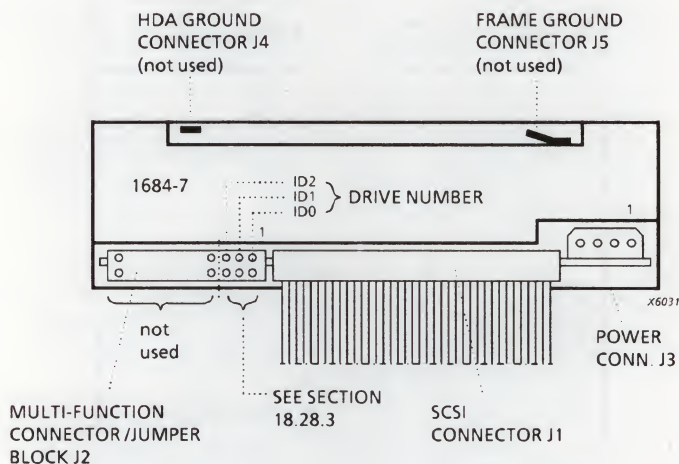
\* pin 25 should be left open

\*\* optional +5VDC, if strap W2 is connected

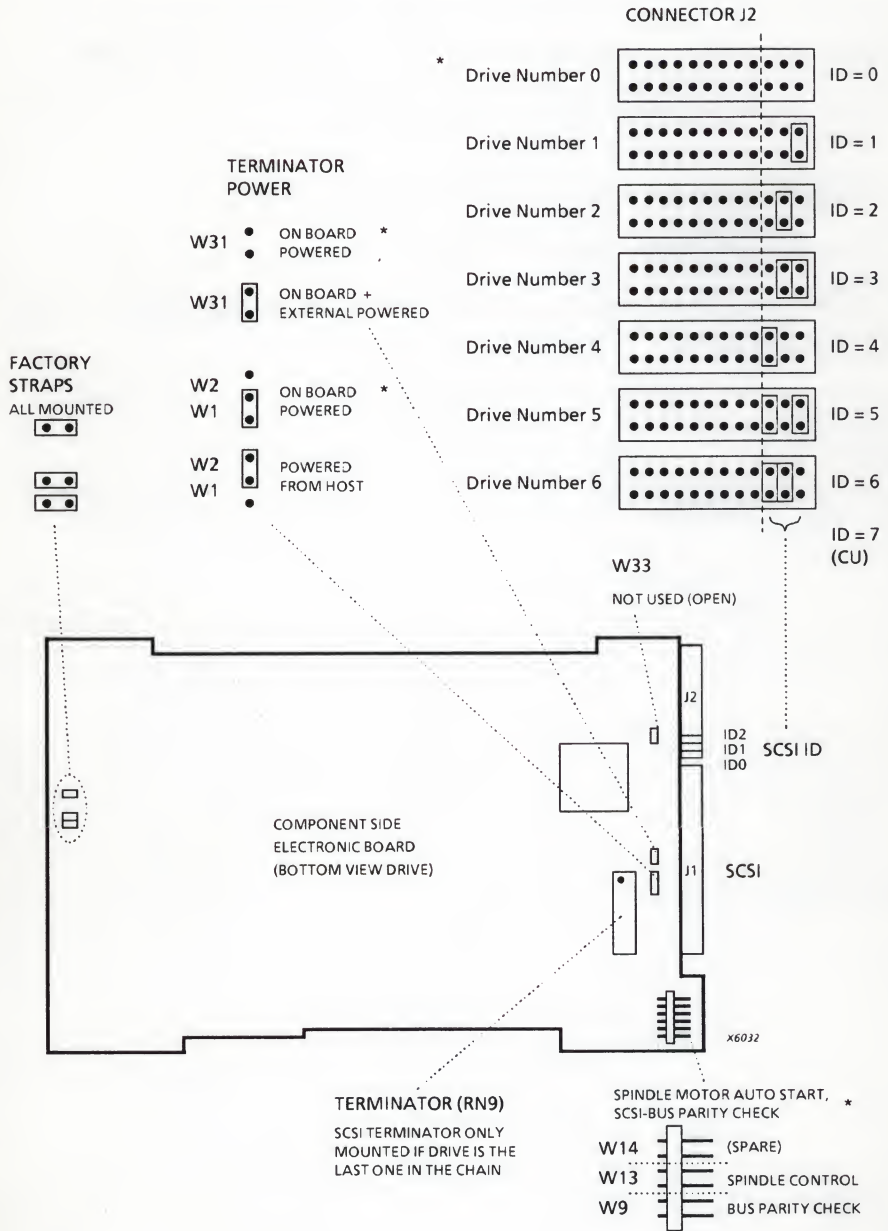


## Power Supply Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC



### 18.28.3. Strap Settings/Adjustments Micropolis 1684-7



### 18.28.5. Installation/Maintenance Micropolis 1684-7

To install the Micropolis 1684-7, perform the following procedure:

- Verify that the correct strap selections have been made (see section 18.28.3).
- Verify that the terminator RN9 is mounted if the drive is the last device on the SCSI chain.
- Mount the mechanical brackets with 2 screws onto the drive.
- Mount the drive into the cabinet (4 screws)
- Connect the SCSI flat cable to connector J1, and the power cable to J3.

## 18.29. MICROPOLIS 1674-7

### 18.29.1. Characteristics Micropolis 1674-7

The Micropolis 1674-7 is a 182.1 Mbyte (unformatted) 5¼" half-height Rigid hard disk drive which supports the Small Computer System Interface (SCSI).

### 18.29.2. Connections Micropolis 1674-7

The drive is interfaced to the system via SCSI connector (J1):

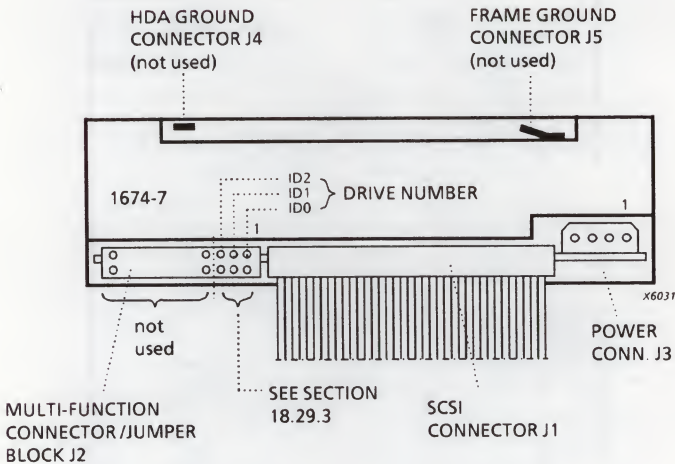
GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	DATABUS0-N
3	4	DATABUS1-N
5	6	DATABUS2-N
7	8	DATABUS3-N
9	10	DATABUS4-N
11	12	DATABUS5-N
13	14	DATABUS6-N
15	16	DATABUS7-N
17	18	DATABUS PARITY-N
19	20	GROUND
21	22	GROUND
23	24	GROUND
*	26	TERMINATOR POWER**
27	28	GROUND
29	30	GROUND
31	32	ATTENTION-N
33	34	GROUND
35	36	BUSY-N
37	38	ACKNOWLEDGE-N
39	40	RESET-N
41	42	MESSAGE-N
43	44	SELECT-N
45	46	CONTROL DATA-N
47	48	REQUEST-N
49	50	INPUT/OUTPUT-N

\* pin 25 should be left open

\*\* optional +5VDC, if strap W2 is connected

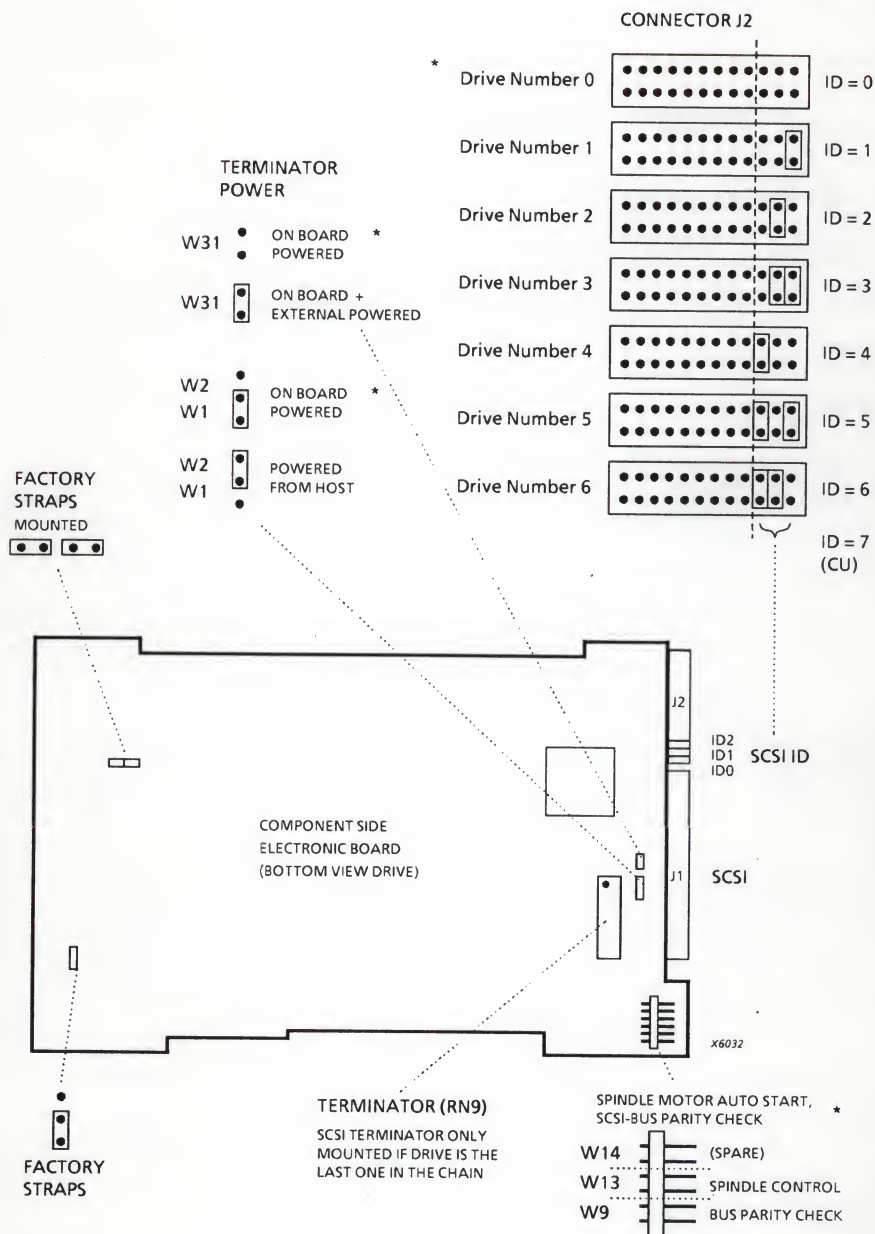
Power Supply Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC





### 18.29.3. Strap Settings/Adjustments Micropolis 1674-7



### 18.29.5. Installation/Maintenance Micropolis 1674-7

To install the Micropolis 1674-7, perform the following procedure:

- Verify that the correct strap selections have been made (see section 18.29.3.).
- Verify that the terminator RN9 is mounted if the drive is the last device on the SCSI chain.
- Mount the mechanical brackets with 2 screws onto the drive.
- Mount the drive into the cabinet (4 screws)
- Connect the SCSI flat cable to connector J1, and the power cable to J3.

## 18.30. SEAGATE ST2383E

### 18.30.1. Characteristics Seagate ST2383E

The Seagate ST2383E is a 5¼" half height hard disk drive, which supports the Enhanced Small Device Interface (ESDI). The unformatted capacity of this drive is 383 MBytes. Formatted there are two capacities possible :

- 338 MBytes (512 Bytes/Sector ; 54 Sectors/Track)
- 350 MBytes (1024 Bytes/Sector ; 28 Sectors/Track)

The drive has four platters. That means eight surfaces. Seven data surfaces and one servo surface (head positioning information).

### 18.30.2. Connections Seagate ST2383E

The Seagate ST2383E has three connectors (see sub-section 18.30.3. for locations) :

- J1 DC Power connector
- J3 Control cable connector
- J4 Data cable connector

Connector J1 :

PIN NUMBER	SIGNAL NAME
1	+ 12V
2	GND
3	GND
4	+ 5V

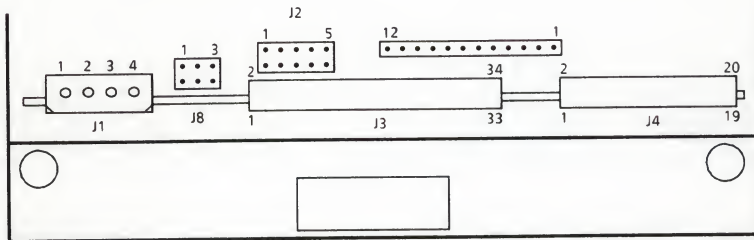
Connector J3 :

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	HEAD SELECT 2(3)-N
3	4	HEAD SELECT 2(2)-N
5	6	WRITE GATE-N
7	8	CONFIGURATION STATUS-N
9	10	TRANSFER ACK-N
11	12	ATTENTION-N
13	14	HEAD SELECT 2(0)-N
15	16	SECTOR-N ADDRESS MARK FOUND-N
17	18	HEAD SELECT 2(1)-N
19	20	INDEX-N
21	22	READY-N
23	24	TRANSFER REQ-N
25	26	DRIVE SELECT 2(0)-N
27	28	DRIVE SELECT 2(1)-N
29	30	DRIVE SELECT 2(2)-N
31	32	READ GATE-N
33	34	COMMAND DATA-N

Connector J4 :

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	DRIVE SELECTED-N	2	SECTOR ADDRESS MARK FOUND-N
3	COMMAND COMPLETE-N	4	ADDRESS MARK ENABLE-N
5	GROUND	6	GROUND
7	WRITE CLOCK	8	WRITE CLOCK-N
9	GROUND	10	READ CLOCK
11	READ CLOCK-N	12	GROUND
13	NRZ WRITE DATA	14	NRZ WRITE DATA-N
15	GROUND	16	GROUND
17	NRZ READ DATA	18	NRZ READ DATA-N
19	GROUND	20	INDEX-N

### 18.30.3. Strap Settings / Adjustments Seagate ST2383E



x6039

1 : Factory use only

2, 3, 4:

2	3	4	BYTES/SECTOR	SECTORS
out	out	out	256	96
out	out	in	512	54
out	in	out	1024	15
out	in	in	special	special
in	out	out	512	53
in	out	in	512	51
in	in	out	1024	28
in	in	in	address mark mode	address mark mode

\* } J2

- 5 : in → drive requires a motor start command to spin up.  
 out → drive does not require a motor start command to spin up. \*

1	2	3	DRIVE (LOCAL ADDRESS)
out	out	out	not valid
in	out	out	1
out	in	out	2
in	in	out	3
out	out	in	4
in	out	in	5
out	in	in	6
in	in	in	7

\* } J8  
 \* = default

**Terminator pack :** The terminator is a resistor module that plugs into a socket in the last drive in a daisychain. Each drive is delivered with a terminator resistor pack. Terminators must be removed from all except the last drive in the daisychain.



### 18.30.5. Installation / Maintenance Seagate ST2383E

Before installing check the strap settings and terminator resistor pack. Refer to sub-section 18.30.3.. Connect the cables to the right connectors. The control cable to connector J3, the data cable to connector J4 and the power cable to connector J1.

## 18.31. QUANTUM LPS105AT

### 18.30.1. Characteristics Quantum LPS105AT

The Quantum LPS105AT is a 3.5" hard disk drive incorporating the IDE interface with embedded controller. The formatted capacity of this drive is 105 MBytes. The drive has 2 platters. That means 4 surfaces resulting in 4 R/W heads.

### 18.30.2. Connections Quantum LPS105AT

The drive is interfaced to the system via three connectors; a 40 pin interface connector (J1), a two pin led connector (LED2) and a 4 pin power connector (J1)

Connector J1 :

PIN NUMBER	SIGNAL NAME
1	+ 12V
2	GND
3	GND
4	+ 5V

Connector J2 :

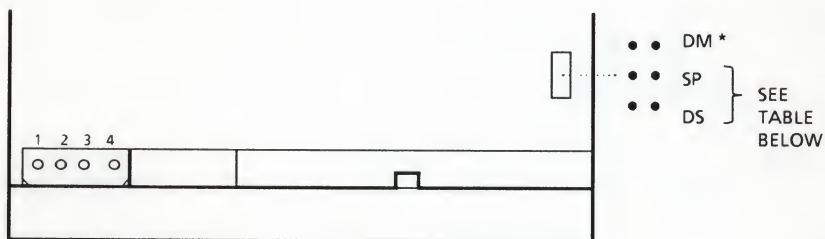
PIN NO	SIGNAL NAME	PIN NO	SIGNAL NAME
1	HOST RESET	21	IOCHRDY-N
2	GROUND	22	GROUND
3	HOST DATA 7	23	IOW-N
4	HOST DATA 8	24	GROUND
5	HOST DATA 6	25	IOR-N
6	HOST DATA 9	26	GROUND
7	HOST DATA 5	27	IOCHRDY-N
8	HOST DATA 10	28	ALE
9	HOST DATA 4	29	RESERVED
10	HOST DATA 11	30	GROUND
11	HOST DATA 3	31	IRQ14
12	HOST DATA 12	32	IOCS16-N
13	HOST DATA 2	33	ADDR 1
14	HOST DATA 13	34	-
15	HOST DATA 1	35	ADDR 0
16	HOST DATA 14	36	ADDR 2
17	HOST DATA 0	37	CS0-N
18	HOST DATA 15	38	CS1-N
19	GROUND	39	LED-N
20	KEY	40	GROUND

Connector LED2 :

LED Activity Indicator Connector

PIN No.	SIGNAL NAME
1	LED-N
2	+ 5VDC

### 18.31.3. Strap Settings / Adjustments Quantum LPS105AT



\* DM means drive mode : standard "out"

DS	SP	FUNCTION
IN	OUT	SINGLE DRIVE CONFIGURATION
IN	IN	MASTER DRIVE IN DUAL DRIVE CONFIGURATION
OUT	OUT	SLAVE DRIVE IN DUAL CONFIGURATION
OUT	IN	SELF TEST SELECTED

### **18.31.5. Installation / Maintenance Quantum LPS105AT**

- Verify that the correct strap selections have been made.
- Use mounting screws supplied with the drive to mount the drive assembly in the PC.
- Connect the interface cable, led cable and power cable.

No preventive maintenance is required.



## **18.32. MAXTOR 7080A**

### **18.32.1. Characteristics Maxtor 7080A**

The Maxtor 7080A is a 3.5" hard disk drive incorporating the IDE interface with embedded controller. The formatted capacity of this drive is 81 MBytes. The drive has 2 platters resulting in 4 R/W heads.

### **18.32.2. Connections Maxtor 7080A**

The drive is interfaced to the system via three connectors; a 40 pin interface connector (J1), a two pin led connector (J12) and a 4 pin power connector (J3)

Connector J3 :

PIN NUMBER	SIGNAL NAME
1	+ 12V
2	GND
3	GND
4	+ 5V

Connector J1 :

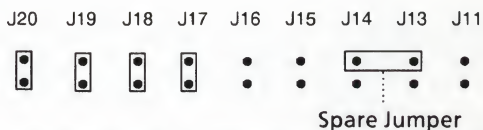
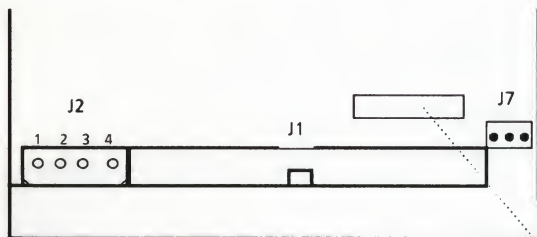
PIN NO	SIGNAL NAME	PIN NO	SIGNAL NAME
1	HOST RESET	21	IOCHRDY-N
2	GROUND	22	GROUND
3	HOST DATA 7	23	IOW-N
4	HOST DATA 8	24	GROUND
5	HOST DATA 6	25	IOR-N
6	HOST DATA 9	26	GROUND
7	HOST DATA 5	27	IOCHRDY-N
8	HOST DATA 10	28	ALE
9	HOST DATA 4	29	RESERVED
10	HOST DATA 11	30	GROUND
11	HOST DATA 3	31	IRQ14
12	HOST DATA 12	32	IOCS16-N
13	HOST DATA 2	33	ADDR 1
14	HOST DATA 13	34	-
15	HOST DATA 1	35	ADDR 0
16	HOST DATA 14	36	ADDR 2
17	HOST DATA 0	37	CS0-N
18	HOST DATA 15	38	CS1-N
19	GROUND	39	LED-N
20	KEY	40	GROUND

Connector J12 :

LED Activity Indicator Connector

PIN No.	SIGNAL NAME
Q1	LED-N
Q2	+ 5VDC

### 18.31.3. Strap Settings / Adjustments Maxtor 7080A



	J20	J19	J18	J17	J16	J15	J14	J13	J11
Only drive in a single drive system *	IN	IN							
Master in dual drive system	IN	OUT							
Slave in dual drive system	OUT	IN							
ECC Bytes 4 Bytes *			IN						
8 Bytes			OUT						
Drive Model Nr 7040A (40MB)				OUT					
7080A (80MB) *				IN					
Idle Mode Latch Option Disabled *					OUT				
Option Enabled					IN				
Reserved Normal Operation *						OUT			
Factory Operation						IN			
Default configuration at Power Up. 80Mb									
Cyl Heads Sectors/Track Cap.									
981 10 17 81.4 *				IN			OUT	OUT	
832 6 33 80.4				IN			OUT	IN	
1024 9 17 76.5				IN			IN	OUT	
1024 9 17 76.5				IN			IN	OUT	
I/O Channel Ready Disabled *									OUT
Enabled									IN

\* = DEFAULT

### **18.32.5. Installation / Maintenance Maxtor 7080A**

- Verify that the correct strap selections have been made.
- Use mounting screws supplied with the drive to mount the drive assembly in the PC.
- Connect the interface cable, led cable and power cable.

No preventive maintenance is required.

## **18.33. SEAGATE ST4766E ESDI (94196)**

### **18.33.1. Characteristics Seagate ST4766E ESDI**

The Seagate ST4766E ESDI is a 5.¼" hard disk drive incorporating the ESDI interface . The formatted capacity of this drive is 676 MBytes. The drive has 8 platters

### **18.33.2. Connections Seagate ST4766E ESDI**

The drive is interfaced to the system via three connectors; a 34-way control signal connector, 20-way data transfer connector and a 4-way power connector.

Power Supply Connector J1

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC



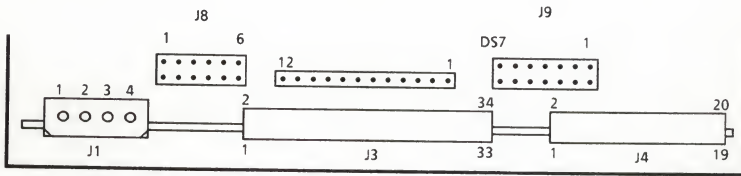
## Control Signal Connector J3

GROUND RETURN	SIGNAL	SIGNAL NAME
1	2	HEAD SELECT 3-N
3	4	HEAD SELECT 2-N
5	6	WRITE GATE-N
7	8	CONFIGURATION STATUS-N
9	10	TRANSFER ACK-N
11	12	ATTENTION-N
13	14	HEAD SELECT 0-N
15	16	SECTOR-N ADDRESS MARK FOUND-N
17	18	HEAD SELECT 1-N
19	20	INDEX-N
21	22	READY-N
23	24	TRANSFER REQ-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	DRIVE SELECT 3-N
31	32	READ GATE-N
33	34	COMMAND-N

## Data Transfer Connector J4

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	DRIVE SELECTED-N	2	SECTOR-N ADDRESS MARK FOUND-N
3	COMMAND COMPLETE-N	4	ADDRESS MARK ENABLE-N
5	RESERVED	6	GROUND
7	+ WRITE CLOCK	8	- WRITE CLOCK
9	RESERVED	10	+ READ CLOCK
11	- READ CLOCK	12	GROUND
13	+ NRZ WRITE DATA	14	- NRZ WRITE DATA
15	GROUND	16	GROUND
17	+ NRZ READ DATA	18	- NRZ READ DATA
19	GROUND	20	INDEX-N

### 18.33.3. Strap Settings / Adjustments Seagate ST4766E ESDI



#### JUMPER J8

1	2	3	4	5	6	SECTORS
1)	out	out	out	2)	3)	96
1)	out	out	in	2)	3)	53
1)	out	in	out	2)	3)	undefined
1)	out	in	in	2)	3)	special
1)	in	out	out	2)	3)	54
1)	in	out	in	2)	3)	undefined
1)	in	in	out	2)	3)	undefined
1)	in	in	in	2)	3)	address mark mode

\*

1) Motor Start Option: IN → drive needs a motor start command to spin up.  
OUT → drive does not need a motor start command to spin up.\*

2) Factory use only. Normally out

3) Reserved. Normally out

\* = Default

#### JUMPER J9

This is the drive select jumper. Drive 0 (no jumper installed) is invalid.

Terminator pack : The terminator is a resistor module that plugs into a socket in the last drive in a daisychain. Each drive is delivered with a terminator resistor pack. Terminators must be removed from all except the last drive in the daisychain.

### **18.33.5. Installation / Maintenance Seagate ST4766E ESDI**

- Verify that the correct strap selections have been made.
- Use mounting screws supplied with the drive to mount the drive assembly in the PC.
- Connect the control cable, data cable and power cable.

No preventive maintenance is required.

## 18.34. SEAGATE ST4766N SCSI (94191)

### 18.34.1. Characteristics Seagate ST4766N SCSI

The Seagate ST4766N a 5.¼" hard disk drive incorporating the SCSI interface . The formatted capacity of this drive is 676 MBytes. The drive has 8 platters

### 18.34.2. Connections Seagate ST4766N SCSI

The drive is interfaced to the system via the SCSI connector J3 and a 4-way DC power connector.

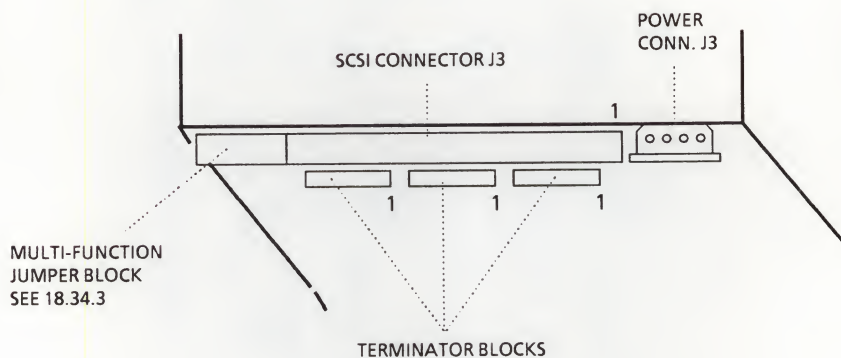
GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	DATABUS0-N
3	4	DATABUS1-N
5	6	DATABUS2-N
7	8	DATABUS3-N
9	10	DATABUS4-N
11	12	DATABUS5-N
13	14	DATABUS6-N
15	16	DATABUS7-N
17	18	DATABUS PARITY-N
19	20	GROUND
21	22	GROUND
23	24	GROUND
*	26	TERMINATOR POWER**
27	28	GROUND
29	30	GROUND
31	32	ATTENTION-N
33	34	GROUND
35	36	BUSY-N
37	38	ACKNOWLEDGE-N
39	40	RESET-N
41	42	MESSAGE-N
43	44	SELECT-N
45	46	CONTROL/DATA-N
47	48	REQUEST-N
49	50	INPUT/OUTPUT-N

\* pin 25 should be left open

\*\* optional +5VDC, if strap W2 is connected

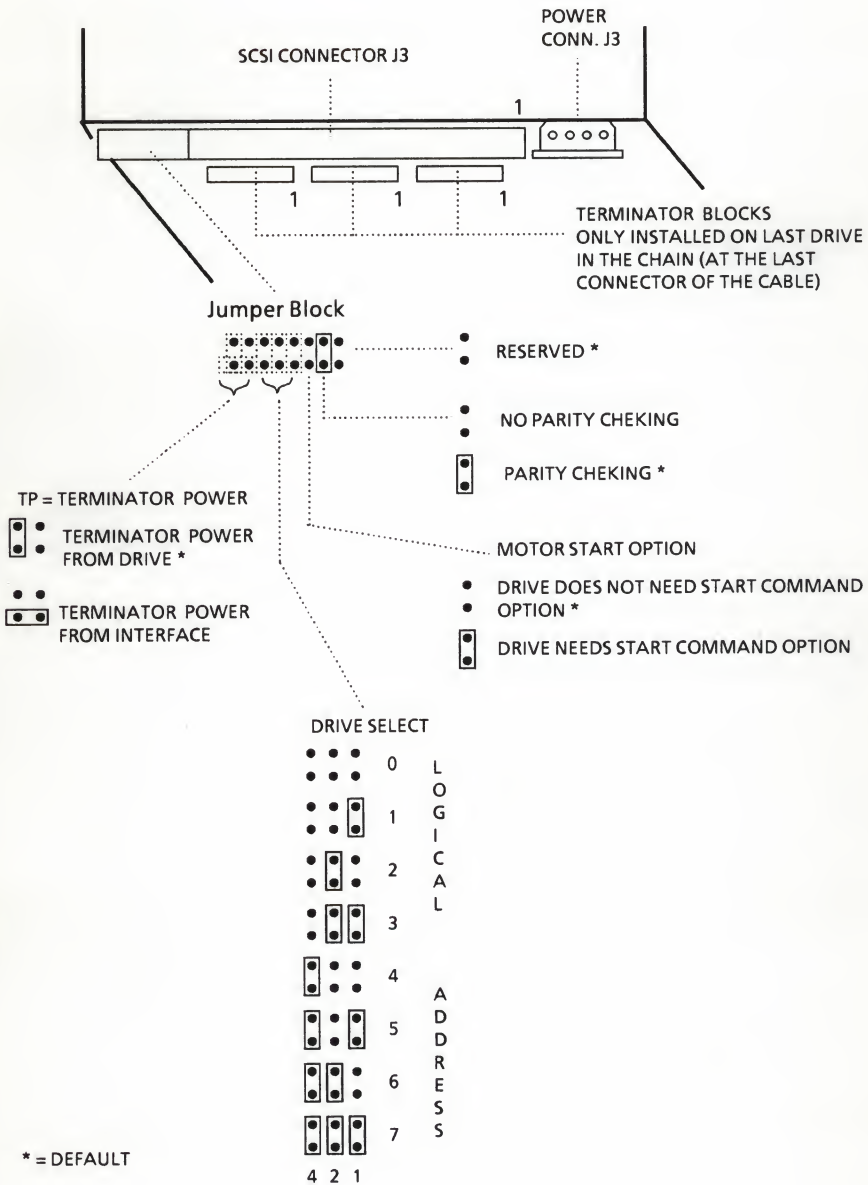
# Power Supply Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC





### 18.34.3. Strap settings/Adjustments Seagate ST4766N SCSI



#### **18.34.5. Installation / Maintenance Seagate ST4766N SCSI**

- Verify that the correct strap selections have been made.
- Use mounting screws supplied with the drive to mount the drive assembly in the PC.
- Connect the SCSI cable and power cable.

No preventive maintenance is required.

## 18.35. SEAGATE ST1144A

### 18.35.1. Characteristics Seagate ST1144A

The Seagate ST1144A 3.½" hard disk drive incorporating the IDE interface . The formatted capacity of this drive is 124.7 MBytes. The drive has 8 platters

### 18.35.2. Connections Seagate ST1144A

The drive is interfaced to the system via the AT-Bus Interface connector and a 4-way DC power connector.

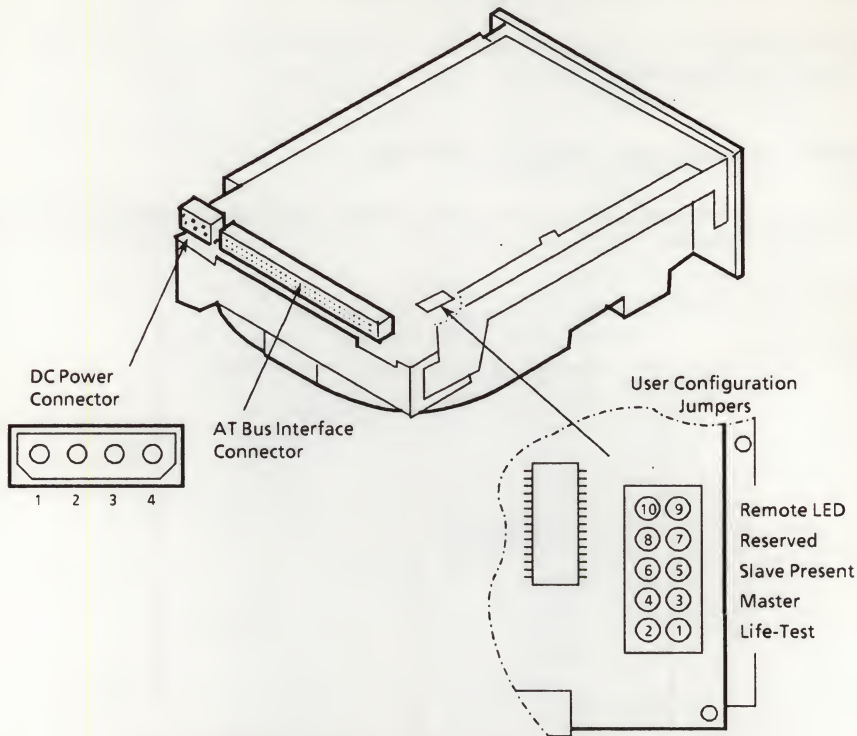
AT- Bus Interface connector

PIN NO	SIGNAL NAME	PIN NO	SIGNAL NAME
1	RESET - N	21	Not Connected
2	GROUND	22	GROUND
3	HOST DATA 7	23	HDIOW-N
4	HOST DATA 8	24	GROUND
5	HOST DATA 6	25	HDIOR-N
6	HOST DATA 9	26	GROUND
7	HOST DATA 5	27	IOCHRDY-N
8	HOST DATA 10	28	HDALE
9	HOST DATA 4	29	Not Connected
10	HOST DATA 11	30	GROUND
11	HOST DATA 3	31	IDINT
12	HOST DATA 12	32	IOCS16-N
13	HOST DATA 2	33	HDA1
14	HOST DATA 13	34	Not Connected
15	HOST DATA 1	35	HDA0
16	HOST DATA 14	36	HDA2
17	HOST DATA 0	37	BHDCS0-N
18	HOST DATA 15	38	BHDCS1-N
19	GROUND	39	LED-N
20	KEY	40	GROUND

DC Power Connector

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 V RETURN
3	+ 5 V RETURN
4	+ 5 VDC

18.35.3. Strap settings/Adjustments Seagate ST1144A



Description	1 - 2	3 - 4	5 - 6	7 - 8	9 - 10
Normal Operation *	out				
Manufacturing use	in				
Single Drive System: Only drive in the system *		in	out		
Dual Drive System: Drive is Master		in	in		
Drive is Slave		out	out		
Reserved				out	
Remote LED active *					in
Remote LED not active					out

\* Default

### 18.35.5. Installation / Maintenance Seagate ST1144A

- Verify that the correct strap selections have been made.
- Use mounting screws supplied with the drive to mount the drive assembly in the PC.
- Connect the AT - Bus interface cable and power cable.

No preventive maintenance is required.





## 18.36. SEAGATE ST351

### 18.36.1. Characteristics Seagate ST351

The Seagate ST351 a 3.½" hard disk drive incorporating the IDE interface. The formatted capacity of this drive is 42.82 MBytes. The drive has 1 platter.

### 18.36.2. Connections Seagate ST351

The drive is interfaced to the system via the AT XT connector and a 4-way DC power connector. (The 3-pin power connector is not used)

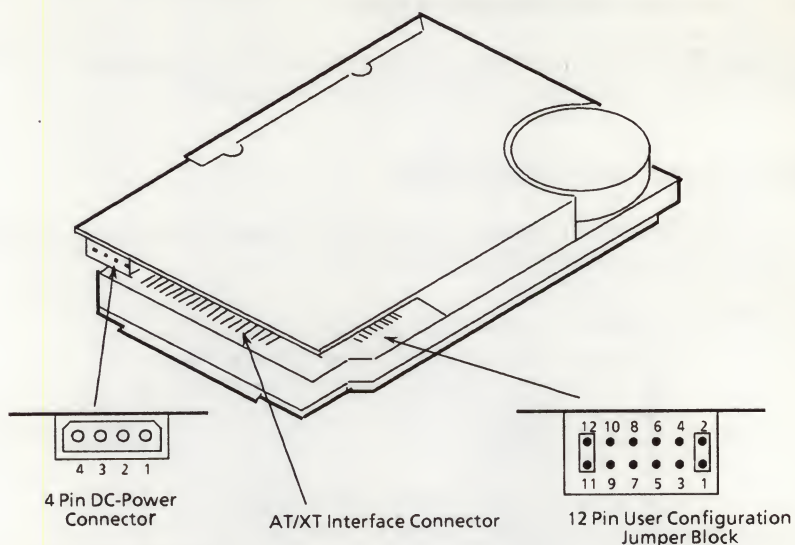
AT XT interface connector

PIN NO	SIGNAL NAME	PIN NO	SIGNAL NAME
1	RESET - N	21	Not Connected
2	GROUND	22	GROUND
3	HOST DATA 7	23	HDIOW-N
4	HOST DATA 8	24	GROUND
5	HOST DATA 6	25	HDIOR-N
6	HOST DATA 9	26	GROUND
7	HOST DATA 5	27	IOCHRDY-N
8	HOST DATA 10	28	HDALE
9	HOST DATA 4	29	Not Connected
10	HOST DATA 11	30	GROUND
11	HOST DATA 3	31	IDINT
12	HOST DATA 12	32	IOCS16-N
13	HOST DATA 2	33	HDA1
14	HOST DATA 13	34	Not Connected or P-DIAG
15	HOST DATA 1	35	HDA0
16	HOST DATA 14	36	HDA2
17	HOST DATA 0	37	BHDCS0-N
18	HOST DATA 15	38	BHDCS1-N
19	GROUND	39	LED-N
20	KEY	40	GROUND

4-Pin Power connector

PIN NUMBER	SIGNAL NAME
1	+ 12V
2	GND
3	GND
4	+ 5V

### 18.36.3. Strap settings/Adjustments Seagate ST351A



Pin	Power
1	+ 12 VDC
2	+ 12 V return
3	+ 5 V return
4	+ 5 VDC

DESCRIPTION	1 - 2	3 - 4	5 - 6	7 - 8	9 - 10	11 - 12
Master mode *	in					
Slave mode	out					
Slave drive present		in				
No slave drive present *		out				
Remote LED used			in			
Remote LED not used *			out			
XT - interface				in		
AT - interface *				out		
Factory test **					out	
Bus reset low **						in

\* Default

\*\* Factory setted, do not change

### **18.36.5. Installation / Maintenance Seagate ST351A**

- Verify that the correct strap selections have been made.
- Use mounting screws supplied with the drive to mount the drive assembly in the PC.
- Connect the interface cable and power cable.

No preventive maintenance is required.





## 18.37. SEAGATE ST1400N

### 18.37.1. Characteristics Seagate ST1400N

The Seagate ST1400N is a 5.¼" hard disk drive incorporating the SCSI interface. The formatted capacity of this drive is 331 / 336 / 337 MBytes. (depending on number of spares sectors per track)

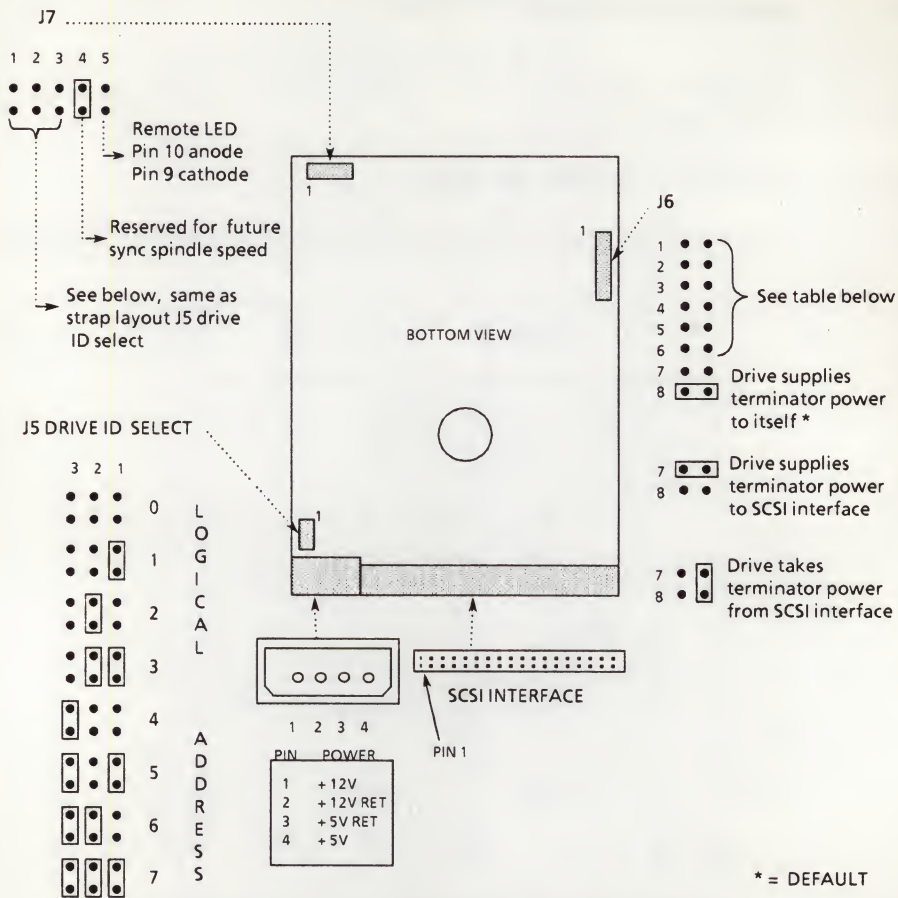
### 18.37.2. Connections Seagate ST1400N

The drive is interfaced to the system via the SCSI connector J3 and a 4-way DC power connector.

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	DATABUS0-N
3	4	DATABUS1-N
5	6	DATABUS2-N
7	8	DATABUS3-N
9	10	DATABUS4-N
11	12	DATABUS5-N
13	14	DATABUS6-N
15	16	DATABUS7-N
17	18	DATABUS PARITY-N
19	20	GROUND
21	22	GROUND
23	24	GROUND
25*	26	TERMINATOR POWER
27	28	GROUND
29	30	GROUND
31	32	ATTENTION-N
33	34	GROUND
35	36	BUSY-N
37	38	ACKNOWLEDGE-N
39	40	RESET-N
41	42	MESSAGE-N
43	44	SELECT-N
45	46	CONTROL DATA-N
47	48	REQUEST-N
49	50	INPUT OUTPUT-N

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 RETURN
3	+ 5 RETURN
4	+ 5 VDC

### 18.37.3. Strap settings/Adjustments Seagate ST1400N SCSI



POS.	SHORT	OPEN
1	Factory use only	Normal use *
2	Motor start option enabled	Motor start option disabled *
3	Delayed motor start option enabled	Delayed motor start option disabled *
4	Entire drive is write protected	Drive is not write protected *
5	Parity check enabled	Parity check disabled *
6	Reserved	Reserved
7	See drawing above	See drawing above
8	See drawing above	See drawing above

### **18.37.5. Installation / Maintenance Seagate ST1400**

- Verify that the correct strap selections have been made.
- Use mounting screws supplied with the drive to mount the drive assembly in the PC.
- Connect the SCSI cable and power cable.

No preventive maintenance is required.



## 18.38. CONNER CP-30104

### 18.38.1. Characteristics Conner CP-30104

The Conner CP-30104 a 3.5" hard disk drive incorporating the IDE-AT interface . The formatted capacity of this drive is 121.7 MBytes.

### 18.38.2. Connections Conner CP-30104

The drive is interfaced to the system via the connector J2 and a 4-way DC power connector J3.

AT- Bus Interface connector

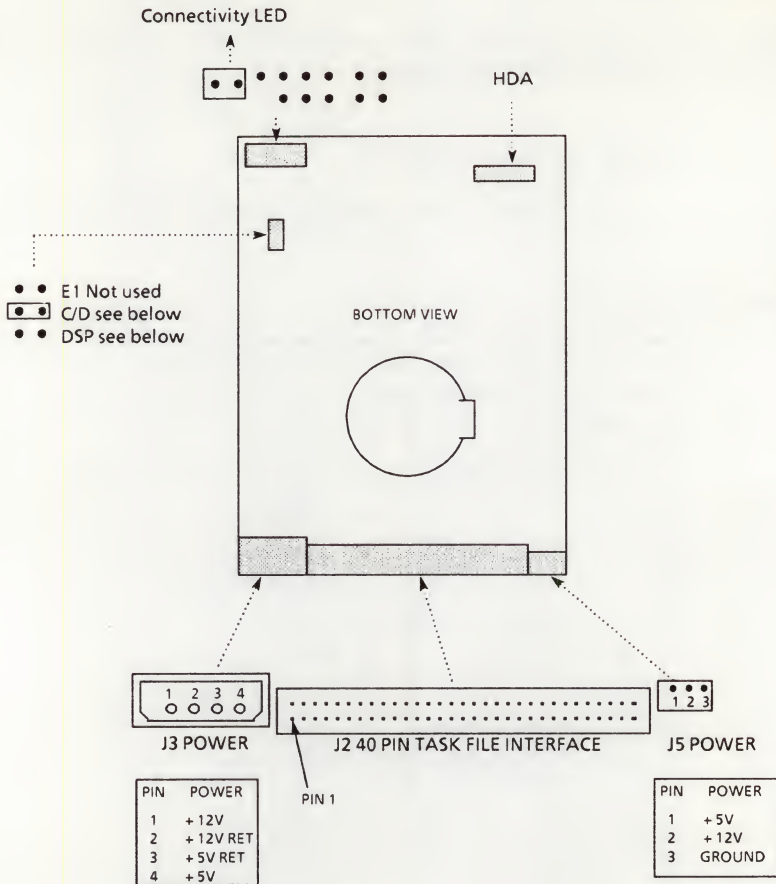
PIN NO	SIGNAL NAME	PIN NO	SIGNAL NAME
1	RESET - N	21	Not Connected
2	GROUND	22	GROUND
3	HOST DATA 7	23	HDIOW-N
4	HOST DATA 8	24	GROUND
5	HOST DATA 6	25	HDIOR-N
6	HOST DATA 9	26	GROUND
7	HOST DATA 5	27	IOCHRDY-N
8	HOST DATA 10	28	HDALE
9	HOST DATA 4	29	Not Connected
10	HOST DATA 11	30	GROUND
11	HOST DATA 3	31	IDINT
12	HOST DATA 12	32	IOCS16-N
13	HOST DATA 2	33	HDA1
14	HOST DATA 13	34	Not Connected
15	HOST DATA 1	35	HDA0
16	HOST DATA 14	36	HDA2
17	HOST DATA 0	37	BHDCS0-N
18	HOST DATA 15	38	BHDCS1-N
19	GROUND	39	Active LED-N
20	KEY	40	GROUND

DC Power Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 V RETURN
3	+ 5 V RETURN
4	+ 5 VDC



### 18.38.3. Strap settings/Adjustments Conner CP-30104



Configuration	DSP	C/D
One drive installed	OPEN *	CLOSED *
Two drives installed - Primary (master) - Secondary (slave)	CLOSED CLOSED	CLOSED OPEN

\* = DEFAULT

### **18.38.5. Installation / Maintenance Conner CP30104**

- Verify that the correct strap selections have been made.
- Use mounting screws supplied with the drive to mount the drive assembly in the PC.
- Connect the interface cable and power cable.

No preventive maintenance is required.



## 18.39. SEGATE ST2383N

### 18.39.1. Characteristics Seagate ST2383N

The Seagate ST2383N a 5.¼" hard disk drive incorporating the SCSI interface . The formatted capacity of this drive is 331 / 337 MBytes. (depending on the number of spare sectors per track)

### 18.39.2. Connections ST2383N

The drive is interfaced to the system via the connector J3 and a 4-way DC power connector .

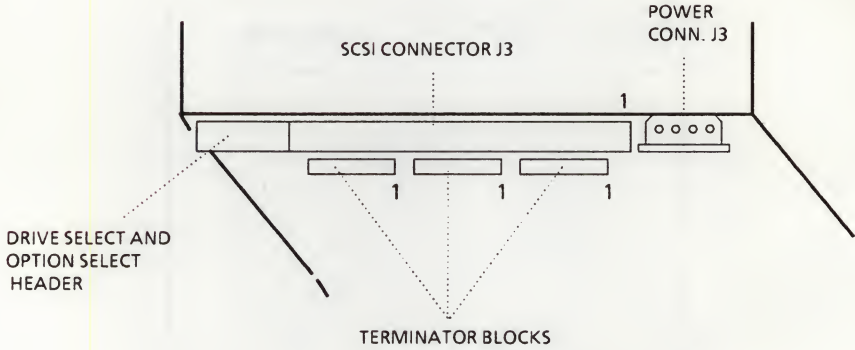
SCSI Interface connector

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	DATABUS0-N
3	4	DATABUS1-N
5	6	DATABUS2-N
7	8	DATABUS3-N
9	10	DATABUS4-N
11	12	DATABUS5-N
13	14	DATABUS6-N
15	16	DATABUS7-N
17	18	DATABUS PARITY-N
19	20	GROUND
21	22	GROUND
23	24	GROUND
25*	26	TERMINATOR POWER
27	28	GROUND
29	30	GROUND
31	32	ATTENTION-N
33	34	GROUND
35	36	BUSY-N
37	38	ACKNOWLEDGE-N
39	40	RESET-N
41	42	MESSAGE-N
43	44	SELECT-N
45	46	CONTROL DATA-N
47	48	REQUEST-N
49	50	INPUT OUTPUT-N

All odd pins are connected to ground, pin 25 is left open

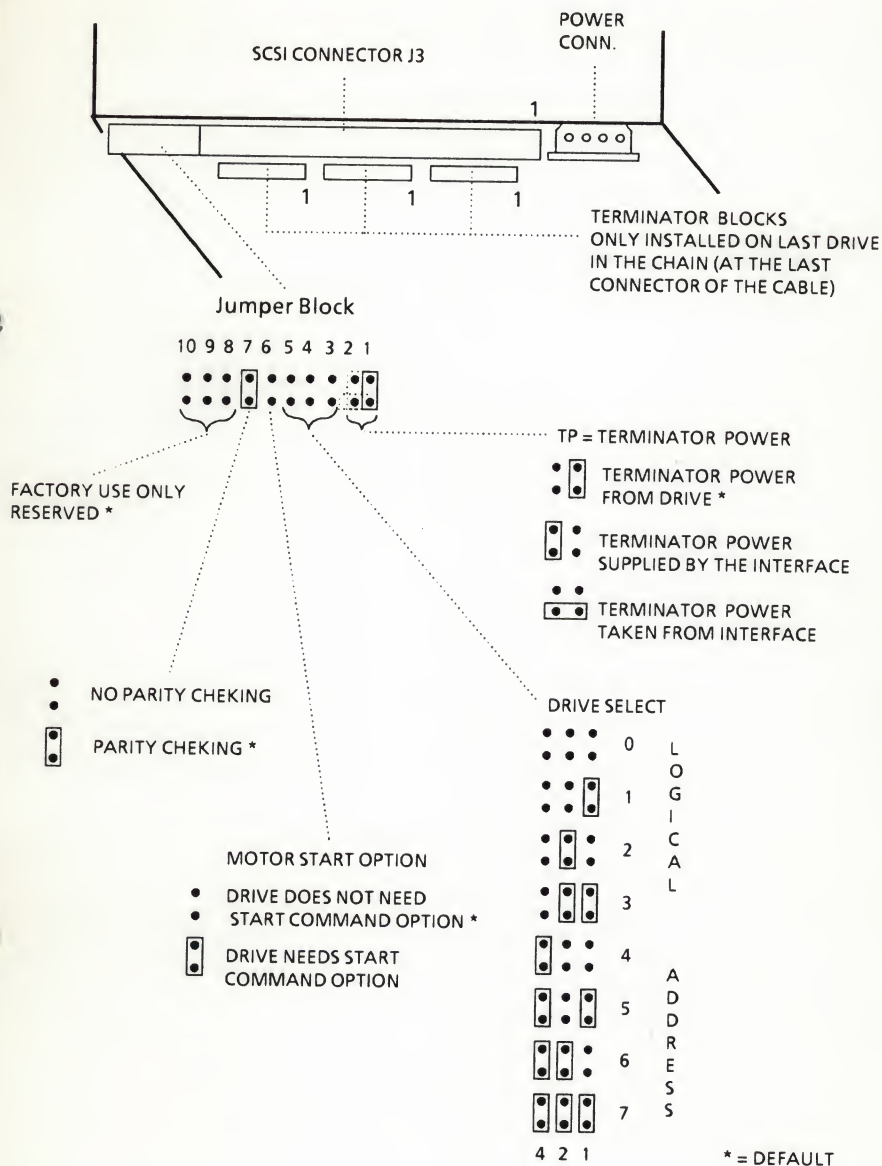
DC Power Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 V RETURN
3	+ 5 V RETURN
4	+ 5 VDC





### 18.39.3. Strap settings/Adjustments Seagate ST2383N



### **18.39.5. Installation / Maintenance Seagate ST2383N**

- Verify that the correct strap selections have been made.
- Use mounting screws supplied with the drive to mount the drive assembly in the PC.
- Connect the SCSI cable and power cable.

No preventive maintenance is required.

## 18.40. WESTERN DIGITAL WDAC2200

### 18.40.1. Characteristics Western Digital WDAC2200

The Western Digital WDAC2200 a 3.5" hard disk drive incorporating the IDE-AT interface . The formatted capacity of this drive is 212 MBytes.

### 18.40.2. Connections Western Digital WDAC2200

The drive is interfaced to the system via the connector J2 and a 4-way DC power connector J3.

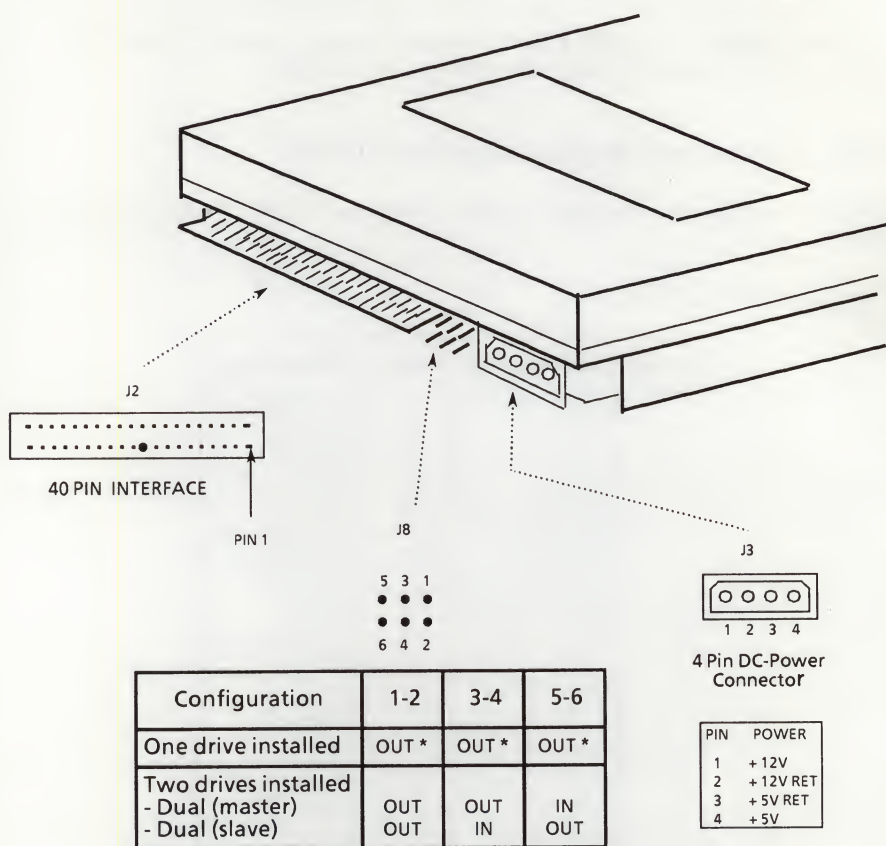
AT- Bus Interface connector

PIN NO	SIGNAL NAME	PIN NO	SIGNAL NAME
1	RESET - N	21	Not Connected
2	GROUND	22	GROUND
3	HOST DATA 7	23	HDIOW-N
4	HOST DATA 8	24	GROUND
5	HOST DATA 6	25	HDIOR-N
6	HOST DATA 9	26	GROUND
7	HOST DATA 5	27	IOCHRDY-N
8	HOST DATA 10	28	HDALE
9	HOST DATA 4	29	Not Connected
10	HOST DATA 11	30	GROUND
11	HOST DATA 3	31	IDINT
12	HOST DATA 12	32	IOCS16-N
13	HOST DATA 2	33	HDA1
14	HOST DATA 13	34	Not Connected
15	HOST DATA 1	35	HDA0
16	HOST DATA 14	36	HDA2
17	HOST DATA 0	37	BHDCS0-N
18	HOST DATA 15	38	BHDCS1-N
19	GROUND	39	Active LED-N
20	KEY	40	GROUND

DC Power Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 V RETURN
3	+ 5 V RETURN
4	+ 5 VDC

### 18.40.3. Strap settings/Adjustments Western Digital WDAC2200



\* = DEFAULT

### 18.40.5. Installation / Maintenance Western Digital WDAC2200

- Verify that the correct strap selections have been made.
- Use mounting screws supplied with the drive to mount the drive assembly in the PC.
- Connect the interface cable and power cable.

No preventive maintenance is required

## 18.41. WESTERN DIGITAL WDAC280

### 18.41.1. Characteristics Western Digital WDAC280

The Western Digital WDAC280 a 3.5" hard disk drive incorporating the IDE-AT interface . The formatted capacity of this drive is 85.3 MBytes.

### 18.41.2. Connections Western Digital WDAC280

The drive is interfaced to the system via the connector J2 and a 4-way DC power connector J3.

AT- Bus Interface connector

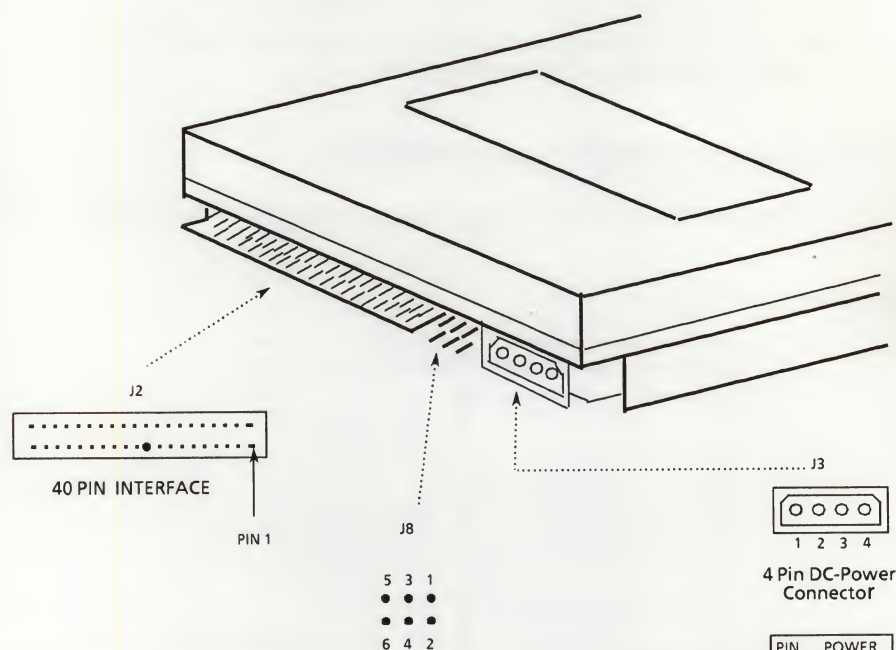
PIN NO	SIGNAL NAME	PIN NO	SIGNAL NAME
1	RESET - N	21	Not Connected
2	GROUND	22	GROUND
3	HOST DATA 7	23	HDIOW-N
4	HOST DATA 8	24	GROUND
5	HOST DATA 6	25	HDIOR-N
6	HOST DATA 9	26	GROUND
7	HOST DATA 5	27	IOCHRDY-N
8	HOST DATA 10	28	HDALE
9	HOST DATA 4	29	Not Connected
10	HOST DATA 11	30	GROUND
11	HOST DATA 3	31	IDINT
12	HOST DATA 12	32	IOCS16-N
13	HOST DATA 2	33	HDA1
14	HOST DATA 13	34	Not Connected
15	HOST DATA 1	35	HDA0
16	HOST DATA 14	36	HDA2
17	HOST DATA 0	37	BHDCS0-N
18	HOST DATA 15	38	BHDCS1-N
19	GROUND	39	Active LED-N
20	KEY	40	GROUND

DC Power Connector J3

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 V RETURN
3	+ 5 V RETURN
4	+ 5 VDC



### 18.41.3. Strap settings/Adjustments Western Digital WDAC280



Configuration	1-2	3-4	5-6
One drive installed	OUT *	OUT *	OUT *
Two drives installed			
- Dual (master)	OUT	OUT	IN
- Dual (slave)	OUT	IN	OUT
- Dual (slave) with Conner CP342 or CP3022	IN	IN	OUT

PIN	POWER
1	+12V
2	+12V RET
3	+5V RET
4	+5V

\* = DEFAULT

### 18.41.5. Installation / Maintenance Western Digital WDAC280

- Verify that the correct strap selections have been made.
- Use mounting screws supplied with the drive to mount the drive assembly in the PC.
- Connect the interface cable and power cable.

No preventive maintenance is required

## 18.42. CONNER CP30084

### 18.42.1. Characteristics Conner CP30084

The Conner CP-30104 a 3.5" hard disk drive incorporating the IDE-AT interface . The formatted capacity of this drive is 121.7 MBytes.

### 18.42.2. Connections Conner CP30084

The drive is interfaced to the system via the connector J2 and a 4-way DC power connector J6.

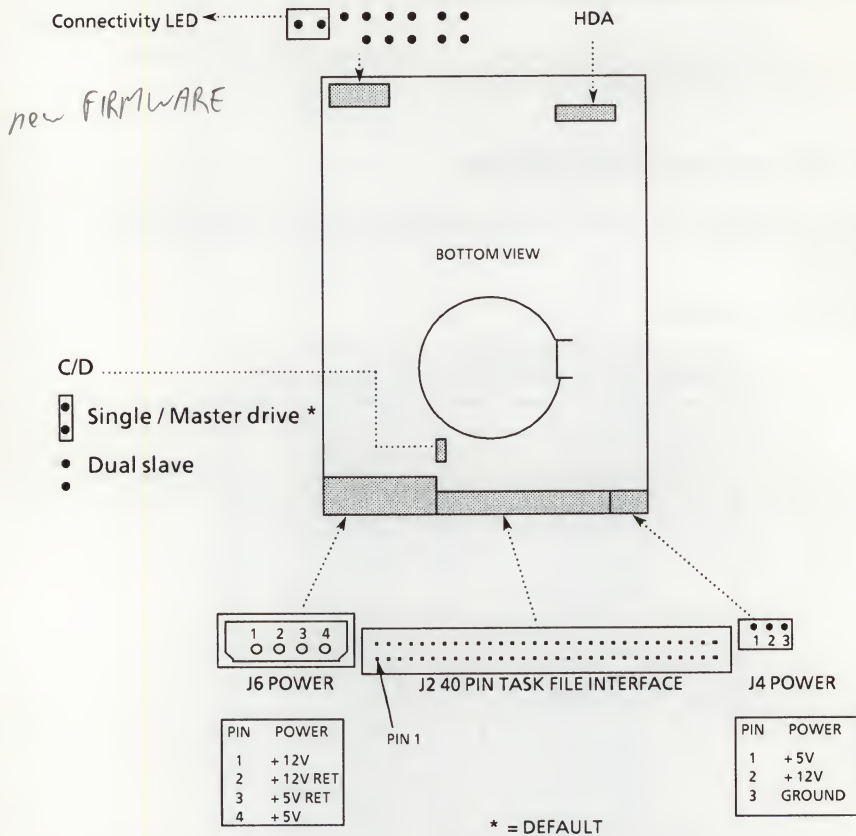
AT- Bus Interface connector

PIN NO	SIGNAL NAME	PIN NO	SIGNAL NAME
1	RESET - N	21	Not Connected
2	GROUND	22	GROUND
3	HOST DATA 7	23	HDIOW-N
4	HOST DATA 8	24	GROUND
5	HOST DATA 6	25	HDIOR-N
6	HOST DATA 9	26	GROUND
7	HOST DATA 5	27	IOCHRDY-N
8	HOST DATA 10	28	HDALE
9	HOST DATA 4	29	Not Connected
10	HOST DATA 11	30	GROUND
11	HOST DATA 3	31	IDINT
12	HOST DATA 12	32	IOCS16-N
13	HOST DATA 2	33	HDA1
14	HOST DATA 13	34	Not Connected
15	HOST DATA 1	35	HDA0
16	HOST DATA 14	36	HDA2
17	HOST DATA 0	37	BHDCS0-N
18	HOST DATA 15	38	BHDCS1-N
19	GROUND	39	Active LED-N
20	KEY	40	GROUND

DC Power Connector J6

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 V RETURN
3	+ 5 V RETURN
4	+ 5 VDC

### 18.42.3. Strap settings/Adjustments Conner CP30084



### 18.42.5. Installation / Maintenance Conner CP30084

- Verify that the correct strap selections have been made.
- Use mounting screws supplied with the drive to mount the drive assembly in the PC.
- Connect the interface cable and power cable.

No preventive maintenance is required

# VERTEX FXD

## 1. Characteristics of VERTEX V185

Disc P-number	P3418
Manufacturer	PRIAM
Manufacture Identification	V185
Commercial Code Nr. 8700 034	18022
Type + capacity (unformatted)	<del>65 MB FXD</del>
Nr. of Sectors / Track	32
Nr. of User Cylinders	1150
Nr. of Heads (DATA)	7
Nr. of Alternate Cylinders	15
Nr. of Service Cylinders	1
Nr. of Discs	4
Servo information	yes
Diameter	5,25"
Type of CU	WDI
Interface	ST412 ST506
Ranks	mix of VERTEX and RODIME on WDI possible

+5V @ 1.5A  
+12V @ 4.5A

Montage in P3202 : (BIOS V2.33)

- zwarte frontplaat verwijderen.
- denk aan strapping (drive 0) & terminator 221/351
- setup als type 12 (Miniscribe 6074)
- initld niet aanpassen : 1024 cyl  
17 sect  
7 heads } 59.5 MB

(max. vld WD1003)

of gebruik SpeedStor (HARDPREP)

## 5.5. Removal and Replacement of Vertex V185

The Vertex drive may be mounted horizontally, with PCB down, or vertically, with LED up.

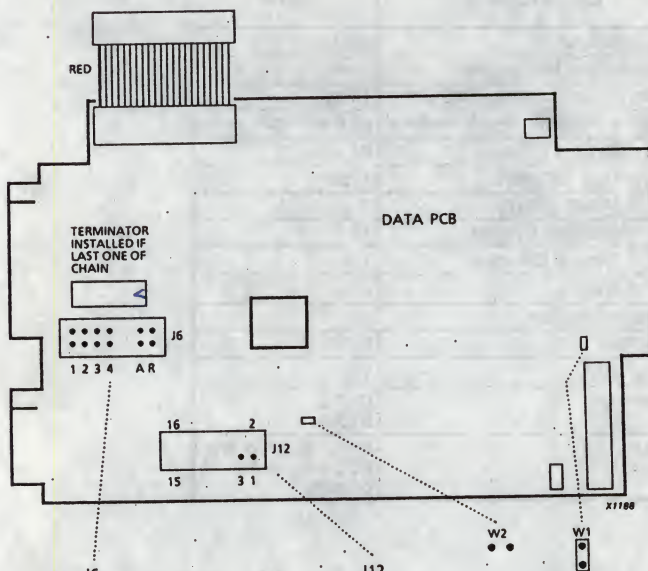
Be careful not to rotate the spindle motor, because heads and disks can be damaged.

It is not advised to change the drive's PCB's in the field.



### 5.3. Strap Settings of Vertex V185

#### Data PCB



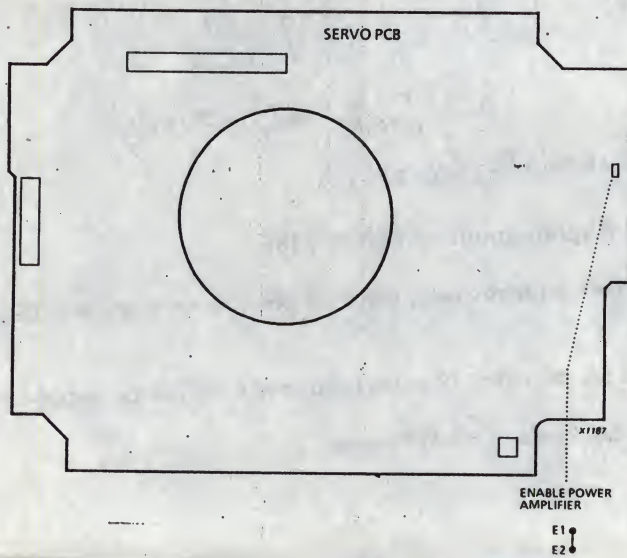
PINS	FUNCTION
1	UNIT SELECT 1
2	UNIT SELECT 2
3	UNIT SELECT 3
4	UNIT SELECT 4
.	FACTORY USE
.	FACTORY USE
A	AUTO ACCESS
R	RADIAL ALWAYS SELECTED

	DRIVE	0	1	2
1	Y	N	N	N
2	N	Y	N	Y
3	N	N	N	Y
4	N	N	N	N
A	N	N	N	N
R	N	N	N	N

PINS	FUNCTION
1	DISABLE DC MOTOR
3	TO J2-10
15-16	LOGIC GROUND TO FRAME GROUND

N  
N  
N

#### Servo PCB





## 19.1. TECHNICAL OVERVIEW

### 19.1.1. Option Cross Reference Guide

OPTION	P 2 1 2 0	P 2 2 3 0	A V E N G	P31xx					P32xx					P33xx							P 3 4 6 4	P 3 4 0 0	P91xx									
				0	0	0	0	2	0	0	0	0	0	3	3	0	0	4	4	5			6	6	7	0	3	3	6	6	7	0
				1	2	2	5	0	0	0	2	4	0	8	1	2	5	8	0	0			1	0	0	5	0	5	0	5	0	5
2: IRWIN 110				X	X	X				X																						
3: ARCHIVE 5945C									X	X	X	X	X		X	X	X							X	X		X					
4: VIPER 2060S / 2150S																X						X			X		X					
5: VIPER 2150L														X			X	X		X	X					X		X				

## 19.1.2. Technical Data

SPECIFICATION	IRWIN 110	ARCHIVE 5945C	VIPER 2060S	VIPER 2150S
Formatted Capacity				
Tape	10.35 MB	45/60 MB	60 MB	150 MB
Track	1.29 MB	5 MB	5 MB	
Block	8.0 KB			
Sector	1.0 KB			
Tape Format		QIC-24	QIC-24	QIC-150 / 120
Tracks (Serpent. pattern)	8	9	9	18 / 15
Blocks (Per Track)	158			
Recording Density	6,400 (bpi)	8,000 (bpi)	8,000 (bpi)	10,000 (bpi)
Flux Density		10,000 (ftpi)	10,000 (ftpi)	12,500 (ftpi)
Encoding Method	MFM			
Recording Mode		NRZI	NRZI	NRZI
Performance				
Data Tranfer rate	250 (Kb/s)	90 (Kb/s)	90 (Kb/s)	112.5 (Kb/s)
Tape Speed R/W	39 (ips)	90 (ips)	90 (ips)	90 (ips)
Tape Speed FF/REW	70 (ips)			
Speed Variation Burst	3.5 (%) (max)			
Speed Variation Average	1.5 (%) (max)			
Start / Stop Time	400 (ms)	300 (ms)	300 (ms)	300 (ms)
Head Positioning Time				
Track to Track	250 (ms)			
Maximum	1 (s)			
Back-up Time	1 (min)	9 (min)		
End to End Positioning Time				
At R/W Speed	57 (s)			
At FF/REW Speed	31 (s)			
Reliability				
Soft Error Rate	1 in 10 <sup>9</sup> (bits)			
Hard Error Rate	1 in 10 <sup>11</sup> (bits)			
Seek Error Rate	1 in 10 <sup>6</sup> (seek)			
Power Consumption				
+ 5 VDC typ.	0.5 (A)		0.5 (A)	0.5 (A)
+ 5 VDC max.			0.7 (A)	0.7 (A)
+ 12 VDC typ.	1.0 (A)	1.6 +/- 0.8 (A)	0.8 (A)	0.8 (A)
+ 12 VDC max.	3.5 (A)	4.0 (A)	1.5 (A)	1.5 (A)
Tape start surge (A)			2.5 (A)	2.5 (A)
Interface		QIC-36	QIC-36	QIC-36
Dimensions (mm)	149 x 203 x 43		41 x 146 x 203	41 x 146 x 203
Weight (kg)	0.77		1.36	1.36
Used Medium	Cartridge Philips SCA07	SCA04 (45MB) SCA06 (60MB)	SCA06 (60MB)	SCA06 (60MB)
Tape Width	0.15" / 3.81 mm			
Tape Length	185' / 56.4 m			

## 19.1. TECHNICAL OVERVIEW

### 19.1.1. Option Cross Reference Guide

OPTION	P 2 1 2 0	P 2 2 3 0	P31xx					P32xx					P33xx					P 3 4 0 0	P91xx			
			0 1	0 2 I	0 2 II	0 5	2 0	0 0 I	0 0 II	0 2	0 4	3 0	0 1	0 2	4 5	6 0	3 0		3 5	6 0	6 5	
2: IRWIN 110			X	X	X				X													
3: ARCHIVE 5945C								X	X	X	X	X	X	X		X	X		X			
4: VIPER 2060S / 2150S													X				X		X			
5: VIPER 2150L															X			X	X			

## 19.1.2. Technical Data

SPECIFICATION	IRWIN 110	ARCHIVE 5945C	VIPER 2060S	VIPER 2150S
Formatted Capacity				
Tape	10.35 MB	45/60 MB	60 MB	150 MB
Track	1.29 MB	5 MB	5 MB	
Block	8.0 KB			
Sector	1.0 KB			
Tape Format		QIC-24	QIC-24	QIC-150 / 120
Tracks (Serpent. pattern)	8	9	9	18 / 15
Blocks (Per Track)	158			
Recording Density	6,400 (bpi)	8,000 (bpi)	8,000 (bpi)	10,000 (bpi)
Flux Density		10,000 (ftpi)	10,000 (ftpi)	12,500 (ftpi)
Encoding Method	MFM			
Recording Mode		NRZI	NRZI	NRZI
Performance				
Data Transfer rate	250 (Kb/s)	90 (Kb/s)	90 (Kb/s)	112.5 (Kb/s)
Tape Speed R/W	39 (ips)	90 (ips)	90 (ips)	90 (ips)
Tape Speed FF/REW	70 (ips)			
Speed Variation Burst	3.5 (%) (max)			
Speed Variation Average	1.5 (%) (max)			
Start / Stop Time	400 (ms)	300 (ms)	300 (ms)	300 (ms)
Head Positioning Time				
Track to Track	250 (ms)			
Maximum	1 (s)			
Back-up Time	1 (min)	9 (min)		
End to End Positioning Time				
At R/W Speed	57 (s)			
At FF/REW Speed	31 (s)			
Reliability				
Soft Error Rate	1 in 10 <sup>9</sup> (bits)			
Hard Error Rate	1 in 10 <sup>11</sup> (bits)			
Seek Error Rate	1 in 10 <sup>6</sup> (seek)			
Power Consumption				
+5 VDC typ.	0.5 (A)		0.5 (A)	0.5 (A)
+5 VDC max.			0.7 (A)	0.7 (A)
+12 VDC typ.	1.0 (A)	1.6 +/- 0.8 (A)	0.8 (A)	0.8 (A)
+12 VDC max.	3.5 (A)	4.0 (A)	1.5 (A)	1.5 (A)
Tape start surge (A)			2.5 (A)	2.5 (A)
Interface		QIC-36	QIC-36	QIC-36
Dimensions (mm)	149 x 203 x 43		41 x 146 x 203	41 x 146 x 203
Weight (kg)	0.77		1.36	1.36
Used Medium	Cartridge Philips SCA07	SCA04 (45MB) SCA06 (60MB)	SCA06 (60MB)	SCA06 (60MB)
Tape Width	0.15" / 3.81 mm			
Tape Length	185' / 56.4 m			



SPECIFICATION	VIPER 2150L
Formatted Capacity	
Tape	150 MB
Track	18 / 15
Block	
Sector	
Tape Format	QIC-150 / 120
Tracks (Serpent. pattern)	
Blocks (Per Track)	
Recording Density	10,000 (bpi)
Flux Density	12,500 (ftpi)
Encoding Method	
Recording Mode	NRZI
Performance	
Data Transfer rate	112.5 (Kb/s)
Tape Speed R/W	90 (ips)
Tape Speed FF/REW	
Speed Variation Burst	7(%)
Speed Variation Average	4(%)
Start / Stop Time	300 (ms)
Head Positioning Time	
Track to Track	
Maximum	
Back-up Time	
End to End Positioning Time	
At R/W Speed	
At FF/REW Speed	
Reliability	
Soft Error Rate	
Hard Error Rate	
Seek Error Rate	
Power Consumption	
+ 5 VDC typ.	0.5 (A)
+ 5 VDC max.	0.7 (A)
+ 12 VDC typ.	0.8 (A)
+ 12 VDC max.	1.5 (A)
Tape start surge (A)	2.5 (A)
Interface	QIC-02
Dimensions (mm)	41 × 146 × 203
Weight (kg)	1.36
Used Medium	
Tape Width	
Tape Length	





## 19.2. IRWIN 110

### 19.2.1. Characteristics Irwin 110

The Irwin 110 is a 10 MByte capacity tape drive/streamer, for use as a hard disk backup device. The tape drive is interfaced to the system via the floppy disk drive controller, and occupies the lower floppy disk drive slot when installed. The data cartridge must be servo-written and formatted before initial use. Servo writing may only be performed on blank tapes (new or demagnetized by a bulk-eraser).

The drive can operate in three modes: streaming, start-stop and random-access. This enables a variety of operations from entire disk backup, to file update, to be performed. Refer to the instruction manual shipped with the drive for operating instructions.

### 19.2.2. Connections Irwin 110

Interface Connector J1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	N.C.
3	4	N.C.
5	6	DRIVE SELECT 4-N
7	8	INDEX-N
9	10	DRIVE SELECT 1-N
11	12	DRIVE SELECT 2-N
13	14	DRIVE SELECT 3-N
15	16	MOTOR ON-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	N.C.

## DC Power Connector J3

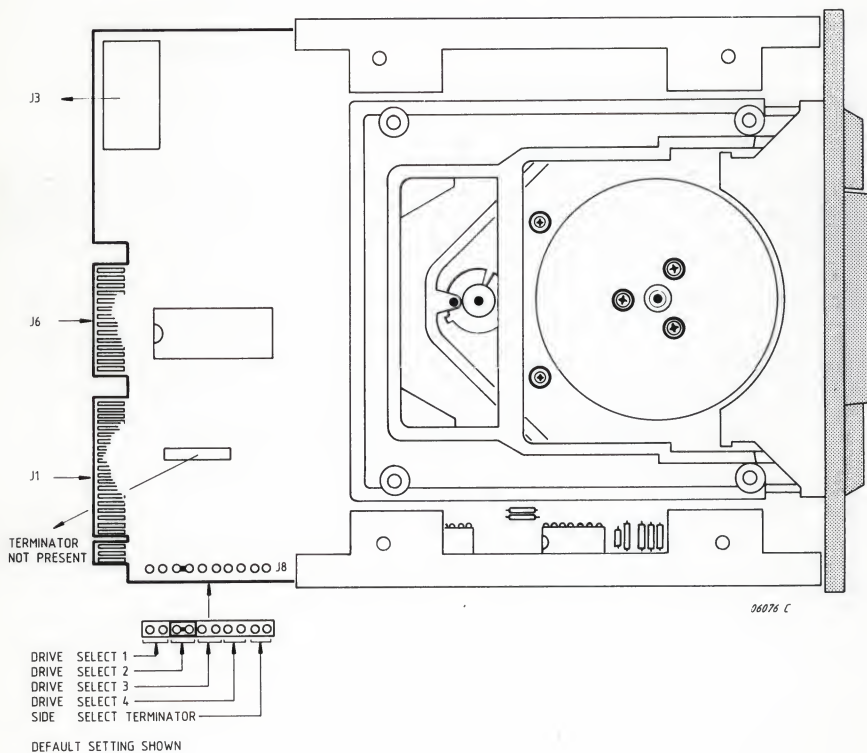
PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	GROUND
3	GROUND
4	+ 5 VDC

## Test Connector J6

SIGNAL PIN	SIGNAL NAME	SIGNAL PIN	SIGNAL NAME
1	DUMP	2	+ PRE-AMP OUT
3	GROUND	4	- PRE-AMP OUT
5	GROUND	6	TP 6
7	THRESH	8	EOT-N
9	N.C.	10	TEST 0
11	RWEN-N	12	TEST 1
13	TO IC 9-19	14	TEST 2
15	N.C.	16	WP
17	TEST 3	18	RESET-N
19	N.C.	20	TIN
21	TACHT-N	22	CARTPRES

### 19.2.3. Strap Settings / Adjustments Irwin 110

**NOTE:** The Irwin 110 should be strapped as drive 2.



### 19.2.5. Installation / Maintenance Irwin 110

The Irwin 110 is installed in the lower floppy disk drive slot, and connected to the system unit in the same manner as a floppy disk drive. The drive B connector must be used to connect the tape drive, and the frame ground fast-on is not used. The terminator should not be installed on the tape drive. Note that pins 2 and 3 of the DC power connector for the drive should be connected. Select with SETUP that there is no drive B installed.

### 19.2.6. Diagnostic Functions Irwin 110

Connector J6 of the Irwin 110 may be used for test purposes, to allow a production tester to test and exercise the tape drive. In this stage, the program tests the status of the TEST0 signal. If it is active (low), the program relinquishes all control over the drive (except motor speed) to an external tester.

Test connector signal assignments are as follows:

1. TEST0 1 = Normal Mode; 0 = Test Mode
2. TEST1 1 = Motor Off; 0 = Motor On
3. TEST2 1 = Motor Reverse; 0 = Motor Forward
4. TEST3 1 = Head Down; 0 = Head Up (Direction)



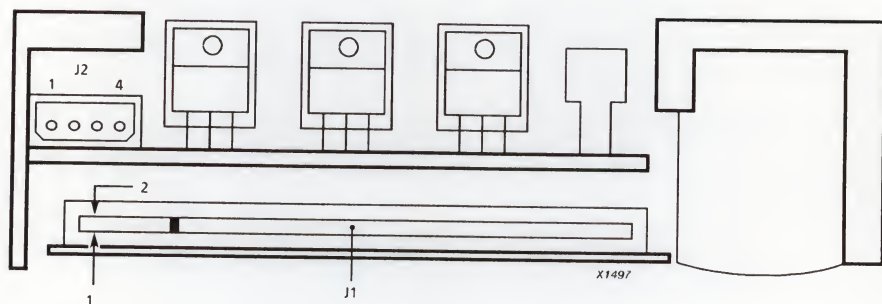
## **19.3. ARCHIVE 5945C**

### **19.3.1. Characteristics ARCHIVE 5945C**

The ARCHIVE 5945C is a 5¼-inch streaming cartridge tape drive . The tape drive is available as an option kit, including controller, software and mounting accessoires.

### 19.3.2. Connections ARCHIVE 5945C

Archive 5945C connector locations



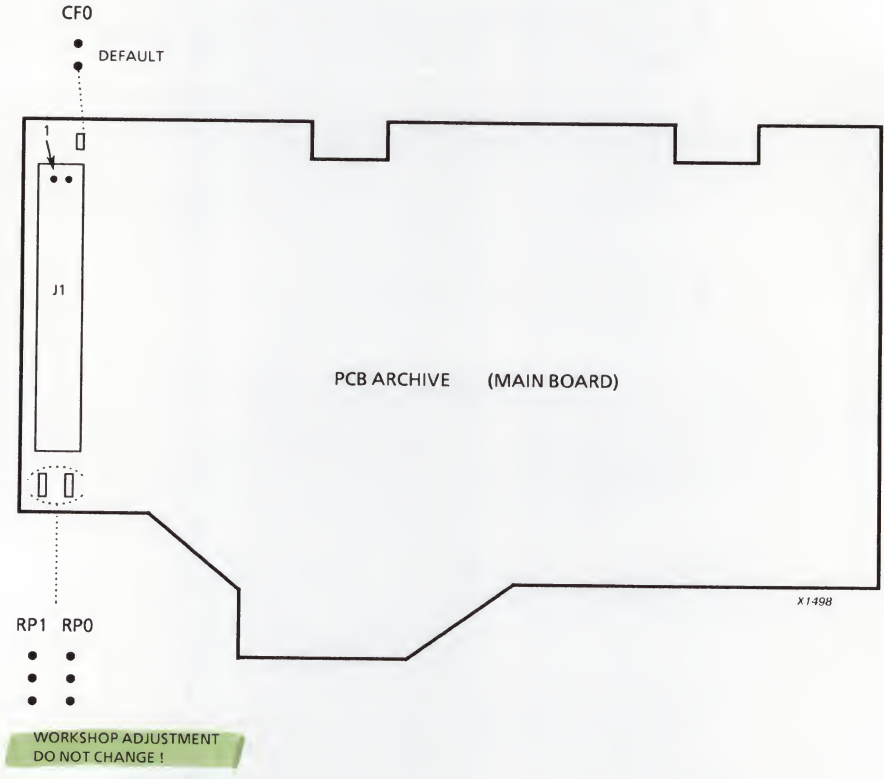
# Tape Controller Connector (QIC-36) J1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
01	02	GO-N
03	04	REV-N
05	06	TR3-N
07	08	TR2-N
09	10	TR1-
11	12	TR0-N
13	14	RST-N
15	16	RES-N
17	18	RES-N
19	20	RES-N
21	22	DSO-N
23	24	HC-N
25	26	RDP-N
27	28	UTH-N
29	30	LTH-N
31	32	SLD-N
33	34	CIN-N
35	36	USF-N
37	38	TCH-N
39	40	WDA-N
41	42	WDA +
43	44	THD-N
45	46	HSD-N
47	48	WEN-N
49	50	EEN-N

## Power Connector J2

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	+ 12 VRET
3	+ 5 VRET
4	+ 5 VDC

19.3.3. Strap Settings / Adjustments ARCHIVE 5945C



### 19.3.5. Installation / Maintenance ARCHIVE 5945C

Remove the top flexible disk drive. Remove the two screws that secure the drive to the front of the chassis. Pull the drive forward, disconnect power cable and interface cable. Then remove the drive from the system. To install the drive, reverse this procedure. When connecting the interface cable, make sure that the cable is connected correctly (pin1 on controller connected to pin1 on the drive).

The tape drive head assembly and the tape hole sensors should be cleaned after every eight hours of actual tape motion. It is also recommended to clean the heads after an initial pass of a new cartridge. If only new cartridges are used, clean the drive after every two hours of actual tape motion. Use a 91% isopropyl alcohol solution for cleaning.

*Cleaning should only be performed with the power off.*





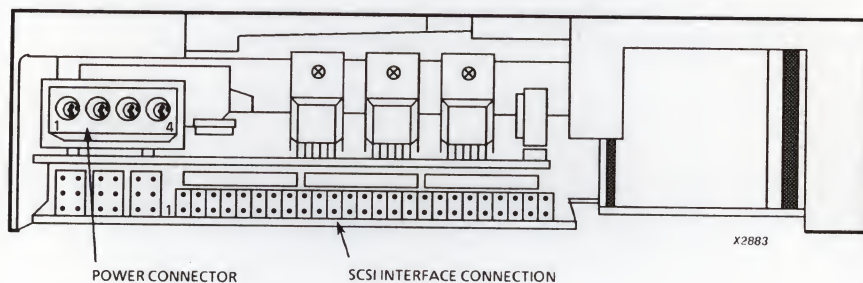
## **19.4. VIPER 2060S / 2150S**

### **19.4.1. Characteristics Viper 2060S / 2150S**

The Viper 2060S / 2150S is a 1/4 inch cartridge streaming tape drive plus intelligent controller in a 5-1/4 inch half high form factor. The controller contains an SCSI-interface (Small Computer Systems Interface) to the host computer (system board). The Viper 2060S is a 60 MByte model and the Viper 2150S a 150 MByte model.

## 19.4.2. Connections Viper 2060S / 2150S

Viper 2060S / 2150S connector locations



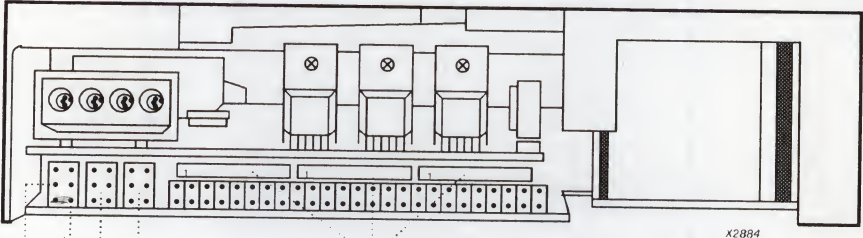
## SCSI Interface Connector

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	GND	2	DB(0)-N
3	GND	4	DB(1)-N
5	GND	6	DB(2)-N
7	GND	8	DB(3)-N
9	GND	10	DB(4)-N
11	GND	12	DB(5)-N
13	GND	14	DB(6)-N
15	GND	16	DB(7)-N
17	GND	18	DB(P)-N
19	GND	20	GND
21	GND	22	GND
23	GND	24	GND
25	N.C.	26	TERM. POWER
27	GND	28	GND
29	GND	30	GND
31	GND	32	ATN-N
33	GND	34	GND
35	GND	36	BSY-N
37	GND	38	ACK-N
39	GND	40	RST-N
41	GND	42	MSG-N
43	GND	44	SEL-N
45	GND	46	C'D-N
47	GND	48	REQ-N
49	GND	50	I/O-N

## Power Connector

PIN NUMBER	SIGNAL NAME
1	+ 12 VDC
2	+ 12 VRET
3	+ 5 VRET
4	+ 5 VDC

### 19.4.3. Strap Settings / Adjustments Viper 2060S / 2150S



TERMINATORS ONLY PRESENT IF VIPER IS LAST  
DRIVE IN THE CHAIN

**PARITY**

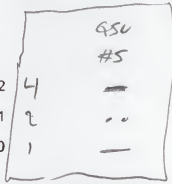
- • DISABLED  
☒ • ENABLED

**DIAG**

- • OPERATIONAL MODE \*  
☒ • DIAGNOSTIC MODE

**SCSI ID**

- • ID2  
• • ID1  
• • ID0



**DISCONNECT SIZE**

- • CF2  
• • CF1  
• • CF0

\* DEFAULT

ID2	ID1	ID0	ADDRESS
OUT	OUT	OUT	0
OUT	OUT	IN	1
OUT	IN	OUT	2
OUT	IN	IN	3
IN	OUT	OUT	<del>4</del>
IN	OUT	IN	5
IN	IN	OUT	6
IN	IN	IN	7

QSV

CF2	CF1	CF0	DISCONNECT SIZE
OUT	OUT	OUT	2K
OUT	OUT	IN	4K
OUT	IN	OUT	6K
OUT	IN	IN	8K
IN	OUT	OUT	12K
IN	OUT	IN	16K
IN	IN	OUT	24K
IN	IN	IN	32K

**Note:** Disconnect size represents the maximum number of bytes that can be transferred over the SCSI-bus during a single Data Phase



#### 19.4.5. Installation / Maintenance Viper 2060S / 2150S

Remove the two screws that secure the tape-streamer to the front of the chassis. Pull the drive forward, disconnect power cable and interface cable. Then remove the tape-streamer from the system. To install the tape-streamer, reverse this procedure. When connecting the interface cable, make sure that the cable is connected correctly .

The tape drive head assembly and the tape hole sensors should be cleaned after every eight hours of actual tape motion. It is also recommended to clean the heads after an initial pass of a new cartridge. If only new cartridges are used, clean the drive after every two hours of actual tape motion. Use a 91% isopropyl alcohol solution for cleaning.

*Cleaning should only be performed with the power off.*



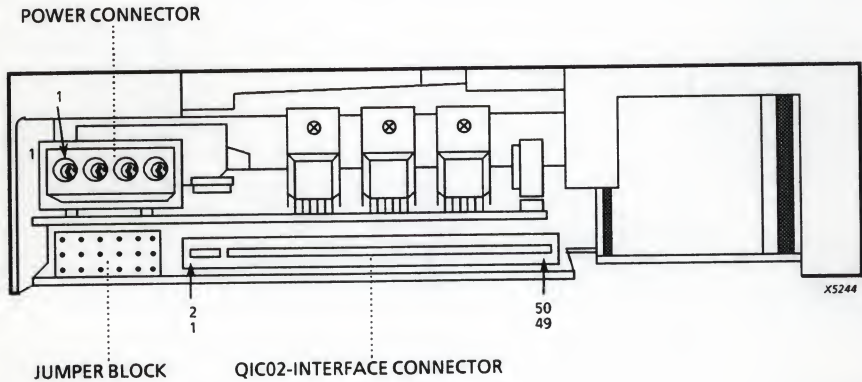
## 19.5. VIPER 2150L

### 19.5.1. Characteristics Viper 2150L

The Viper 2150L is a 1/4 inch cartridge streaming tape drive plus intelligent controller in a 5-1/4 inch half-high form factor. The controller contains a QIC-02 interface to the host computer. The Viper 2150L is a 150 MByte model.

### 19.5.2. Connections Viper 2150L

Viper 2150L connector locations



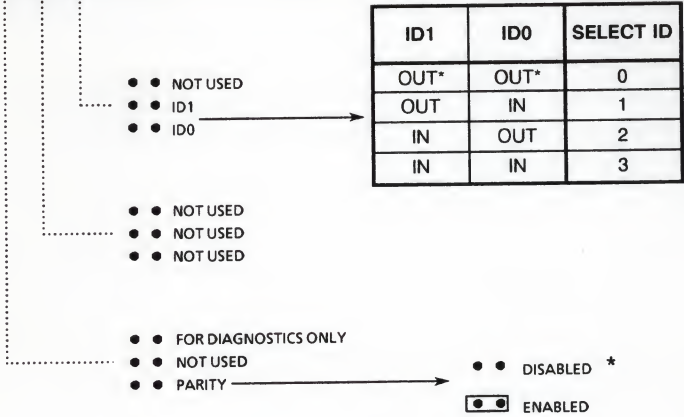
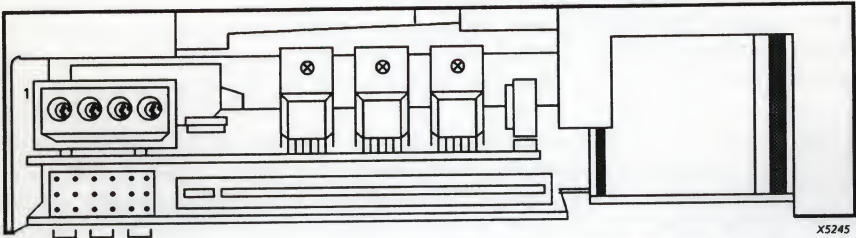
## QIC-2 Interface Connector

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	GND	2	N.U.
3	GND	4	N.U.
5	GND	6	N.U.
7	GND	8	N.U.
9	GND	10	HB(P)-N
11	GND	12	HB(7)-N
13	GND	14	HB(6)-N
15	GND	16	HB(5)-N
17	GND	18	HB(4)-N
19	GND	20	HB(3)-N
21	GND	22	HB(2)-N
23	GND	24	HB(1)-N
25	GND	26	HB(0)-N
27	GND	28	ONL-N
29	GND	30	REQ-N
31	GND	32	RST-N
33	GND	34	XFR
35	GND	36	ACK-N
37	GND	38	RDY-N
39	GND	40	EXC-N
41	GND	42	DIR-N
43	GND	44	N.U.
45	GND	46	N.U.
47	GND	48	N.U.
49	GND	50	N.U.

## Power Connector

PIN No.	SIGNAL NAME
1	+ 12 VDC
2	+ 12 VRET
3	+ 5 VRET
4	+ 5 VDC

19.5.3. Strap Settings / Adjustments Viper 2150L



\* DEFAULT SETTING



### **19.5.5. Installation / Maintenance Viper 2150L**

Remove the two screws that secure the tape-streamer to the front of the chassis. Pull the drive forward, disconnect power cable and interface cable. Then remove the tape-streamer from the system. To install the tape-streamer, reverse this procedure. When connecting the interface cable, make sure that the cable is connected correctly .

The tape drive head assembly and the tape hole sensors should be cleaned after every eight hours of actual tape motion. It is recommended to clean the heads after an initial pass of a new cartridge. If only new cartridges are used, clean the drive after every two hours of actual tape motion. Use a 91% isopropyl alcohol solution for cleaning. Cleaning should only be performed with the power off.

## 20. PRINTERS

Section:

Page:

1.: Technical Overview	20.1-1
1.1: Option Cross Reference Guide	20.1-1
1.2: Technical Data	20.1-2

2: Epson FX80 / 100	n.a.	n.a.	20.2-1	n.a.	20.2-3	20.2-3
3: Epson FX80+ / 100+	n.a.	n.a.	20.3-1	n.a.	20.3-3	20.3-3
4: Epson FX85 / 105	n.a.	n.a.	20.4-1	n.a.	20.4-3	20.4-3
5: TEC F10-40 Serial	n.a.	n.a.	20.5-1	n.a.	n.a.	n.a.
6: General Printer GP300 PX1/300L PX1	n.a.	n.a.	20.6-1	n.a.	20.6-4	n.a.
7: Epson FX800 / 1000	n.a.	n.a.	20.7-1	n.a.	20.7-3	20.7-4
8: Qume LaserTen	n.a.	n.a.	20.8-1	n.a.	n.a.	n.a.
9: Qume Sprint 11/55	n.a.	n.a.	20.9-1	n.a.	n.a.	n.a.
10: Epson FX850/1050	n.a.	n.a.	20.10-1	n.a.	20.10-3	20.10-3
11: General Printer GP310/310F	20.11-1	n.a.	20.11-2	n.a.	20.11-7	n.a.
12: NMS 1432 (Olivetti DM 100)	n.a.	n.a.	n.a.	n.a.	20.12-1	20.12-1
13: NMS 1440 / 1441 (Olivetti DM282/292)	n.a.	n.a.	n.a.	n.a.	20.13-1	20.13-1
14: NMS 1480/1481 (TEC LB 1305 B)	20.14-1	n.a.	20.14-1	n.a.	20.14-5	20.14-6

Subsection:

1	Characteristics	↑
2	Connections	↑
3	Strap Settings / Adjustments	↑
4	Modification History	↑
5	Installation / Maintenance	↑
6	Diagnostic Functions	↑

**NOTE:** n.a. means that this section is not available for this unit.

15: NMS 1443 (Olivetti PR24)	n.a.	n.a.	n.a.	n.a.	20.15-1	20.15-1
16: NMS 1436.00I (Seikosha SP1200)	n.a.	n.a.	20.16-1	n.a.	20.16-3	20.16-3
17: NMS 1433	20.17-1	n.a.	20.17-1	n.a.	20.17-2	20.17-4
18: NMS 1439	20.18-1	n.a.	20.18-1	n.a.	20.18-4	20.18-6
19: NMS 1461	20.19-1	n.a.	20.19-1	n.a.	20.19-4	20.19-6
20: NMS 1467	20.20-1	n.a.	20.20-1	n.a.	20.20-4	20.20-6
21: PP402 (P2942)	20.21-1	n.a.	20.21-1	n.a.	20.21-5	20.21-6
22: PP405 (P2945)	20.22-1	n.a.	20.22-1	n.a.	20.22-3	20.22-4

## Subsection:

1	Characteristics	_____↑
2	Connections	_____↑
3	Strap Settings / Adjustments	_____↑
4	Modification History	_____↑
5	Installation / Maintenance	_____↑
6	Diagnostic Functions	_____↑

**NOTE:** n.a. means that this section is not available for this unit.

## 20.1. TECHNICAL OVERVIEW

### 20.1.1. Option Cross Reference Guide

OPTION	P 2 1 2 0	P 2 2 3 0	A V E N G	P31xx				P32xx				P33xx								P 3 4 6 4	P 3 4 0 0	P91xx							
				0 1	0 2 I	0 2 II	0 5	2 0	0 0 I	0 2 II	0 4	3 0	3 8	0 1	0 2	4 5	4 8	5 0	6 0			6 1	7 0	3 0	3 5	6 0	6 5	7 0	
2: Epson FX80 / 100				x	x	x			x	x	x	x											x						
3: Epson FX80 + / 100 +				x	x	x			x	x	x	x											x						
4: Epson FX85 / 105				x	x	x			x		x	x											x						
5: TEC F10-40 Serial	x	x		x	x	x	x	x	x	x	x	x	x		x		x												
6: General Printer GP300 PX1				x	x	x	x		x	x	x	x		x									x						
7: Epson FX800 / 1000	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x		x					x	x		x			
8: Qume LaserTen	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x		x					x	x		x			
9: Qume Sprint 11/55				x	x	x	x		x	x	x	x		x	x														
10: Epson FX850/1050				x	x	x	x		x	x	x	x		x	x								x	x		x			
11: General Printer GP310.310F				x	x	x	x		x	x	x	x			x			x						x		x			
12: NMS 1432 (Olivetti DM100)				x	x	x	x		x	x	x	x		x	x			x											
13: NMS 1440 / 1441 (Olivetti DM282-292)				x	x	x	x		x	x	x	x		x	x			x											
14: NMS 1480/1481 (TEC LB 1305 B)				x	x	x	x		x	x	x	x		x	x			x											
15: NMS 1443 (Olivetti PR24)																		x											
16: NMS 1436 '001 (Seikosha SP1200)	x	x						x					x				x												
17: NMS 1433																													
18: NMS 1439																													
19: NMS 1461																									x	x	x	x	x
20: NMS 1467																									x	x	x	x	x
21: PP 402 (P2942)																									x	x	x	x	x
22: PP 405 (P2945)																									x	x	x	x	x



## 20.1.2. Technical Data

	EPSON FX80 / 100	EPSON FX80 + / 100 +	EPSON FX85 / 105	TEC F10-40	GENERAL PRINTER GP300 PX1/ 300L PX1
<b>TYPE</b>	Impact Dot Matrix	Impact Dot Matrix	Impact Dot Matrix, 9 Pin	Daisy Wheel 96 Char.	Impact Dot Matrix
<b>INTERFACE</b> Standard	Centronics 8-bit par.	Centronics 8-bit par.	Centronics 8-bit par.	RS232C	Centronics 8-bit par.
Optional	RS232C	RS232C	RS232C		
<b>PRINT SPEED (cps)</b>	160	160 (Pica draft) 137 (pica cond.) 96 (Elite)	160 (Pica draft) 160 (Pica cond.) 32 (Pica NLQ) 96 (Elite draft)	40	300 (data qual., 9x9 dots) 80 (18x25 or 18x50 dots)
<b>CHARACTERS PER LINE</b>	80 / 136 (pica) 137 / 233 (pica condensed) 40 / 68 (pica enlarged) 68 / 116 (condensed enlarged) 96 / 163 (elite) 160 / 272 (elite condensed) 48 / 81 (elite enlarged)	80 / 136 (pica) 137 / 233 (pica condensed) 40 / 68 (pica enlarged) 96 / 163 (elite) 160 / 272 (elite condensed) 48 / 81 (elite enlarged)	80 / 136 (pica) 132 / 233 (pica condensed) 40 / 68 (pica enlarged) 96 / 163 (elite) 160 / 272 (elite condensed) 48 / 81 (elite enlarged)	163 at 12 cpi 136 at 10 cpi	144 at 10 c.p.i. 172 at 12 c.p.i. 216 at 15 c.p.i.



	<b>EPSON FX800 / 1000</b>	<b>EPSON FX850/1050</b>	<b>GENERAL PRINTER GP 310/310F</b>	<b>NMS 1432 (OLIVETTI DM100)</b>	<b>NMS 1440/1441 (OLIVETTI DM282/292)</b>
<b>TYPE</b>	Impact Dot Matrix, 9 Pin	Impact Dot Matrix	Impact Dot Matrix	Impact Dot Matrix	Impact Dot Matrix
<b>INTERFACE</b>					
Standard	Centronics 8-bit par.	Centronics 8-bit par.	Centronics 8-bit par. RS232C	Centronics 8 bits parallel	Centronics 8-bit par.
Optional	RS232C	RS232C			RS232C
<b>PRINT SPEED (cps)</b>	200 (Pica draft) 170 (Pica cond.)  100 (Pica emph.)  50 Pica (NLQ)  240 (Elite draft)	220 (draft pica)  264 (draft elite)  183 (condensed draft pica)  107 (emph. draft pica)  45 (NLQ normal pica)	370 (data 12 c.p.i.)  310 (data 10 c.p.i.)  150 (LQ 15 c.p.i.)  100 (LQ 10 c.p.i.)	120 (Draft)  25 (NLQ)	240 (high speed draft)  180 (draft)   40 (NLQ)
<b>CHARACTERS PER LINE</b>	80 / 136 (pica)  132 / 233.(pica condensed) 40 / 68 (pica enlarged)  96 / 163 (elite)  160 / 272 (elite condensed) 48 / 81 (elite enlarged)	80/136 (pica)  137/233.(pica condensed)  96/163 (elite)  160/272elite condensed)		80 at 10 c.p.i.  96 at 12 c.p.i.  120 at 15 c.p.i.  137 at 17.1 c.p.i.  160 at 20 c.p.i.  180 at 24 c.p.i.  240 at 30 c.p.i.	80/136 at 10 c.p.i.  137/233 at 17.1 c.p.i.  96/163 at 12 c.p.i.  160/272 at 20 c.p.i.

	<b>NMS 1480/1481 (TEC LB 1305 B)</b>	<b>NMS 1443</b>	<b>NMS 1436/001</b>	<b>NMS 1433</b>	<b>NMS 1439</b>
<b>TYPE</b>	Laser	Impact Dot Matrix, 9 Pin	Impact Dot Matrix, 9 Pin	Impact Dot Matrix, 9 Pin	Impact Dot Matrix, 9 Pin
<b>INTERFACE</b>					
Standard	Centronics 8 bits parallel RS232 RS422 Serial	Centronics 8 bits parallel RS232-C Serial	Centronics 8 bits parallel	Centronics 8 bits parallel	Centronics 8 bits parallel
Optional					
<b>PRINT SPEED (cps)</b>	6 pages per minute  (continuous printing)	240 (high speed draft 12 c.p.i.)  200 (draft 10c.p.i.)  50 NLQ  50 NLQ	120 (draft 10/12 c.p.i.)  30 LQ (12 c.p.i.)	192 (Draft Fast Elite 12 c.p.i.)  160 (draft 10 c.p.i.) 48 (NLQ Fast Elite 12 c.p.i.) 40 (NLQ 10 c.p.i.)	240 (Draft 12 c.p.i.)  200 (draft 10 c.p.i.) 40 (NLQ 12 c.p.i.) 40 (NLQ 10 c.p.i.)
<b>CHARACTERS PER LINE</b>		136 at 10 c.p.i. 163 at 12 c.p.i. 204 at 15 c.p.i. 233 at 17 c.p.i. 272 at 20 c.p.i. 326 at 24 c.p.i. 408 at 30 c.p.i.	80 at 10 c.p.i. 96 at 12 c.p.i. 137 at 17 c.p.i. 160 at 20 c.p.i.	80 at 10 c.p.i. 96 at 12 c.p.i. 137 at 17 c.p.i. 160 at 20 c.p.i.	40 at 5 c.p.i. 48 at 6 c.p.i. 68 at 8.5 c.p.i. 80 at 10 c.p.i. 96 at 12 c.p.i. 137 at 17 c.p.i. 160 at 20 c.p.i.

	NMS 1461	NMS 1467	PP 402	PP 405
<b>TYPE</b>	Impact Dot Matrix, 24 Pin	Impact Dot Matrix, 24 Pin	Impact Dot Matrix, 24 Pin	Impact Dot Matrix, 24 Pin
<b>INTERFACE</b>				
Standard	Centronics 8 bits parallel	Centronics 8 bits parallel	Centronics 8 bits parallel RS232C V.24, V.28 Serial	Centronics 8 bits parallel RS232C V.24, V.28 RS422 Serial
Optional				
<b>PRINT SPEED (cps)</b>	240 (Draft 12 c.p.i.) 200 (Draft 10 c.p.i.) 80 (LQ 12 c.p.i.) 66 (LQ 10 c.p.i.)	240 (Draft 12 c.p.i.) 200 (Draft 10 c.p.i.) 80 (LQ 12 c.p.i.) 66 (LQ 10 c.p.i.)	280 (Draft 12 c.p.i.) 230 (Draft 10 c.p.i.) 95 (LQ 12 c.p.i.) 80 (LQ 10 c.p.i.)	600(Draft) 330 (NLQ) 165 (LQ)
<b>CHARACTERS PER LINE</b>	40 at 5 c.p.i. 48 at 6 c.p.i. 68 at 8.55 cpi. 80 at 10 c.p.i. 96 at 12 c.p.i. 120 at 15 c.p.i. 137 at 17 c.p.i. 160 at 20 c.p.i.	68 at 5 c.p.i. 81 at 6 c.p.i. 116 at 8.55 cpi. 136 at 10 c.p.i. 163 at 12 c.p.i. 204 at 15 c.p.i. 233 at 17 c.p.i. 272 at 20 c.p.i.	136 at 10 c.p.i. 163 at 12 c.p.i. 204 at 15 c.p.i. 233 at 17 c.p.i. 272 at 20 c.p.i.	136 at 10 c.p.i. 163 at 12 c.p.i. 204 at 15 c.p.i. 233 at 17 c.p.i. 272 at 20 c.p.i.



	EPSON FX80 / 100	EPSON FX80 + / 100 +	EPSON FX85 / 105	TEC F10-40	GENERAL PRINTER GP300 PX1/ 300L PX1
<b>MEDIA HANDLING</b>					
PIN FEED	9.5"-10"/ 4"-16"	9.5"-10"/ 4"-16"	9.5"-10"/ 4"-16"		ref. to CEM 5122 991 3329X
TRACTOR FEED (optional)	4"-9.5"/	4"-9.5"/	4"-9.5"/	15" max	
FRICTION FEED	7.25"-8.5"/ 7.25-14.4"	7.25"-8.5"/ 7.25-14.4"	7.25"-8.5"/ 7.25-14.4"	15" MAX	
Nr of Copies	1 + 2 Carb Cop thickness 0.3 mm max	1 + 2 Carb Cop thickness 0.3 mm max	1 + 2 Carb Cop thickness 0.3 mm max	1 + 2 Carb Cop thickness 0.2 mm max	
<b>RIBBON</b>					
Colour type	Black cartridge FX80 8709 002 32301	Black cartridge FX80 + 8709 002 32301	Black cartridge FX85 8709 002 32301	Black cartridge  multistrike 8709 002 32102	Black cartridge Fabric draft quality 8709 002 33101
	FX100 8709 002 32701	FX100 + 8709 002 32701	FX105 8709 002 32701	Fabric 8709 002 32401	letter quality 8709 002 32001
<b>POWER REQUIREMENTS</b>					
Voltage (VAC)	120/220/240 not selectable	120/220/240 not selectable	120/220/240 not selectable	180-254 or 90-127	100-127/ 200-240
Frequency (Hz)	49.5-60.5	49.5-60.5	49.5-60.5	50/60	50/60
Consumption (VA)	70	70	70		150 max
<b>DIMENSIONS</b>					
Width (mm)	420/594	420/594	420/594	574	636
Height (mm)	100/106	100/106	100/106	154	165
Depth (mm)	347/354	347/354	347/354	400	427
<b>Weight (kg)</b>	7.5/10.4	7.8/10.4	7.8/10.4	14	16



	EPSON FX800 / 1000	EPSON FX850/1050	GENERAL PRINTER GP310/310F	NMS 1432 (OLIVETTI DM100)	NMS 1440/1441 (OLIVETTI DM282/292)
<b>MEDIA HANDLING</b>					
PIN FEED	9.5"-10", 4"-16"	9.5"-10"/ 4"-16"			
TRACTOR FEED	4"-9.5",	4"-9.5"/ 4" -16"		4"-9.5"	3.5" -8.5"/ 3.5" -15"
FRICTION FEED	7.25"-8.5", 7.25-14.4"	7.25"-8.5"/ 7.25-14.4"	14.88" max (380 mm max)	127 to 229 mm	7.25" -8.5"/ 7.25" -11"
Nr of Copies	1 + 2 Carb Cop thickness 0.3 mm max	1 + 2 Carb Cop thickness 0.3 mm max	1 + 3 / 1 + 5	1 + 1 thickness 0.18 mm max	1 + 2 thickness 0.3 mm max
<b>RIBBON</b>					
Colour type	Black cartridge FX800 8709 002 32301  FX1000 8709 002 32701	Black cartridge FX850 8709 002 32301  FX1050 8709 002 32701	Black cartridge Fabric draft quality 8709 002 33101 letter quality 8709 002 32001	Black Cartridge  NMS 1016/00 8622 520 16009	Black cartridge NMS 1013
<b>POWER REQUIREMENTS</b>					
Voltage (VAC)	120/220/240 not selectable	120/220/240 not selectable	100 - 127/ 200 - 240	220V-240V not selectable	220/240 not selectable
Frequency (Hz)	49.5-60.5	49.5-60.5	50 / 60	50	50 - 60
Consumption (VA)	120	150 max	135 max		75
<b>DIMENSIONS</b>					
Width (mm)	420/594	430/605	600	346	404/549
Height (mm)	100/106	150	165	74	69
Depth (mm)	347/354	360	427	253	292
Weight (kg)	7.2/10.1	9.5/12.5	16	4	7/8.5

	<b>NMS 1480/1481 (TEC LB1305 B)</b>	<b>NMS 1443</b>	<b>NMS 1436/001</b>	<b>NMS 1433</b>	<b>NMS 1439</b>
<b>MEDIA HANDLING</b>					
PIN FEED	n.a.	3.0"-15.5"	4.0"-10.0"	4.0"-10"	4.0"-10"
TRACTOR FEED (optional)	n.a.	3.0"-15.5"			
FRICTION FEED	n.a.	Top :6.5"- 16.9" Front:2.7"-17"	4.0"-10.0"	4.0"-10"	4.0"-10"
Nr of Copies	n.a.	1 + 4 Carb Cop	1 + 2 thickness 0.2 mm max.	1 + 2 total thickness <0.2mm	1 + 2 total thickness <0.28mm
<b>RIBBON</b>					
Colour	n.a.	Black	Black	Black	Black
type	n.a.	Cartridge NMS1012 8622 520 12009	SBC436	Cartridge NMS1041 8622 520 41009	Cartridge NMS1017 8622 520 17009
<b>POWER REQUIREMENTS</b>					
Voltage (VAC)	198-264	220/240 not selectable	230 ± 15%	220/240 not selectable	220/240 ± 10% not selectable
Frequency (Hz)	50	50/60	50 ± 3%	50	50
Consumption (VA)	printing: 600 stand by: 100		30 max.	printing: 24 stand by: 9	printing: 32 stand by: 10
<b>DIMENSIONS</b>					
Width (mm)	410 (without tray) 622 (incl. tray)	333	403	380	393
Height (mm)	210	130	119	110	112
Depth (mm)	390	592	278	280	290
Weight (kg)	16	13	3.8	3.3	6.5

	NMS 1461	NMS 1467	PP 402	PP 405
<b>MEDIA HANDLING</b>				
PIN FEED	4.0"-10"	4.0"-15"	4.0"-16"	4.13"-12"
TRACTOR FEED (optional)				
FRICTION FEED				
Nr of Copies	1 + 3 copies thickness < 0.28mm	1 + 3 copies thickness < 0.28mm	1 + 3 copies thickness < 0.3mm	total thickness < 0.5mm
<b>RIBBON</b>				
Colour	Black	Black	Black	Black
type	Cartridge NMS1038/00 8622 520 38009	Cartridge NMS1040 8622 520 40009	Cartridge 8707 002 37801	Cartridge Fabric black S/RC78 8709 002 37801 Fabric 4-colour S/RC79 8709 002 37901
<b>POWER REQUIREMENTS</b>				
Voltage (VAC)	220-240	220-240	90-125 198-264	100-120 200-240
Frequency (Hz)	50	50	45-65	50-60
Consumption (VA)	printing: 65 stand by: 12	printing: 65 stand by: 12	100 (max.)	240 (max.)
<b>DIMENSIONS</b>				
Width (mm)	428	571	606	635
Height (mm)	130	130	127	273 (without stacker) 400 (max.)
Depth (mm)	314	314	350	390 (foot) 415 (overall)
<b>Weight (kg)</b>	7	9	12	22.7 (basic model) 28.6 (with all cassettes)

## 20.2. EPSON FX80 / 100

### 20.2.3. Strap Settings / Adjustments Epson FX80 / 100

#### Parallel Interface Dip Switch 1

SWITCH	SETTING	FUNCTION
1	ON * OFF	POWER-ON CONDENSED PRINT POWER-ON PICA SIZE PRINT
2	ON * OFF	ZERO FONT Ø ZERO FONT O
3	ON * OFF	PAPER END DETECT INVALID PAPER END DETECT VALID
4	ON * OFF	INPUT BUFFER ENABLED INPUT BUFFER DISABLED
5	ON * OFF	POWER-ON EMPHASIZED PRINT POWER-ON PICA SIZE PRINT

SWITCH			NATIONAL VERSION
6	7	8	
ON	ON	ON	U.S.A.
ON	ON	OFF	FRANCE
ON	OFF	ON	GERMANY
ON	OFF	OFF	U.K. *
OFF	ON	ON	DENMARK
OFF	ON	OFF	SWEDEN
OFF	OFF	ON	ITALY
OFF	OFF	OFF	SPAIN

#### Parallel Interface Dip Switch 2

SWITCH	SETTING	FUNCTION
1	* ON OFF	SELECT IN-N SIGNAL FIXED SELECT IN-N SIGNAL NOT FIXED
2	ON * OFF	BUZZER VALID BUZZER INVALID
3	ON * OFF	1" SKIP-OVER VALID 1" SKIP-OVER INVALID
4	ON * OFF	AUTOMATIC LF WITH CR NO AUTOMATIC LF WITH CR

\* Default Setting



## Serial Interface Dip Switch

SWITCH	SETTING	FUNCTION
1		BAUD RATE, SEE TABLE BELOW
2	ON * OFF	7 BIT WORD 8 BIT WORD
3		BAUD RATE, SEE TABLE BELOW
4		BAUD RATE, SEE TABLE BELOW
5	ON * OFF	EVEN PARITY ODD PARITY
6	ON * OFF	PARITY ENABLED PARITY DISABLED
7		BAUD RATE, SEE TABLE BELOW
8	* ON OFF	SERIAL MODE ENABLED PARALLEL MODE ENABLED

Baud Rate Selection Table

BAUD RATE	SW1 7	SW1 1	SW1 4	SW1 3
75	ON	ON	ON	ON
110	ON	ON	ON	OFF
300	ON	OFF	ON	OFF
600	ON	OFF	OFF	ON
1200	ON	OFF	OFF	OFF
2400	OFF	ON	ON	OFF
4800	OFF	ON	OFF	ON
9600	OFF	ON	OFF	OFF
19200	OFF	OFF	ON	ON

\* Default Setting



## 20.2.5. Installation / Maintenance Epson FX 80 / 100

### The Printers Self Test

To start the printers Self Test:  
press the LF button while switching the power on.

To stop the Self Test:  
switch off the printer.

### The Hex Dump Mode

To start the Hex Dump mode:  
press both LF and FF buttons while switching the printer on.

To stop the Hex Dump mode:  
switch off the printer.

## 20.2.6 Diagnostic Functions Epson FX 80 / 100

AUDIBLE ERROR DETECTION SIGNALS	CAUSE
0 0 0 0 0 0 0 0	An error is detected in a by the slave CPU controlled function, e.g.: Carriage trouble
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Paper end detected
0 0 0 1	An abnormal voltage is detected
1 1 1 1	Short circuited print head driver transistor(s) (Also the print head may be damaged; check by measuring the print head resistance)

a '1' represents a long tone; a '0' represents a short tone; the space in between represents a pause.

For more information regarding this printer, refer to the following service manuals:-

5122 991 3404X (Printer Technical Manual)  
5122 991 3425X (Printer Mechanism Manual P2906/P2908)  
5122 991 3426X (Printer Mechanism Manual P2907/P2909)



## 20.3. EPSON FX80 + / 100 +

### 20.3.3. Strap Settings / Adjustments Epson FX80 + / 100 +

#### Parallel Interface Dip Switch 1

SWITCH	SETTING	FUNCTION
1	ON * OFF	POWER-ON CONDENSED PRINT POWER-ON PICA SIZE PRINT
2	ON * OFF	ZERO FONT Ø ZERO FONT O
3	ON * OFF	PAPER END DETECT INVALID PAPER END DETECT VALID
4	* ON OFF	INPUT BUFFER ENABLED INPUT BUFFER DISABLED
5	ON * OFF	POWER-ON EMPHASIZED PRINT POWER-ON PICA SIZE PRINT

SWITCH			NATIONAL VERSION
6	7	8	
ON	ON	ON	U.S.A.
ON	ON	OFF	FRANCE
ON	OFF	ON	GERMANY
ON	OFF	OFF	U.K. *
OFF	ON	ON	DENMARK
OFF	ON	OFF	SWEDEN
OFF	OFF	ON	ITALY
OFF	OFF	OFF	SPAIN

#### Parallel Interface Dip Switch 2

SWITCH	SETTING	FUNCTION
1	* ON OFF	SELECT IN-N SIGNAL FIXED SELECT IN-N SIGNAL NOT FIXED
2	ON * OFF	SHEETFEEDER CONNECTED NO SHEETFEEDER
3	ON * OFF	1" SKIP-OVER VALID 1" SKIP-OVER INVALID
4	ON * OFF	AUTOMATIC LF WITH CR NO AUTOMATIC LF WITH CR

\* Default Setting

## Serial Interface Dip Switch

SWITCH	SETTING	FUNCTION
1		BAUD RATE, SEE TABLE BELOW
2	ON * OFF	7 BIT WORD 8 BIT WORD
3		BAUD RATE, SEE TABLE BELOW
4		BAUD RATE, SEE TABLE BELOW
5	ON * OFF	EVEN PARITY ODD PARITY
6	ON * OFF	PARITY ENABLED PARITY DISABLED
7		BAUD RATE, SEE TABLE BELOW
8	* ON OFF	SERIAL MODE ENABLED PARALLEL MODE ENABLED

Baud Rate Selection Table

BAUD RATE	SW1 7	SW1 1	SW1 4	SW1 3
75	ON	ON	ON	ON
110	ON	ON	ON	OFF
300	ON	OFF	ON	OFF
600	ON	OFF	OFF	ON
1200	ON	OFF	OFF	OFF
2400	OFF	ON	ON	OFF
4800	OFF	ON	OFF	ON
9600	OFF	ON	OFF	OFF
19200	OFF	OFF	ON	ON

\* Default Setting

## 20.3.5. Installation / Maintenance Epson FX 80 + / 100 +

### The Printers Self Test

To start the printers Self Test:  
press the LF button while switching the power on.

To stop the self test:  
switch off the printer.

### The Hex Dump Mode

To start the Hex Dump mode:  
press both LF and FF buttons while switching the printer on.

To stop the Hex Dump mode:  
switch off the printer.

## 20.3.6. Diagnostic Functions Epson FX 80 + / 100 +

AUDIBLE ERROR DETECTION SIGNALS	CAUSE
0 0 0 0 0 0 0 0	An error is detected in a by the slave CPU controlled function, e.g.: Carriage trouble
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Paper end detected
0 0 0 1	An abnormal voltage is detected
1 1 1 1	Short circuited print head driver transistor(s) (Also the print head may be damaged; check by measuring the print head resistance)

a '1' represents a long tone; a '0' represents a short tone; the space in between represents a pause.

For more information regarding this printer, refer to the following service manuals:-

5122 991 3404X (Printer Technical Manual)  
5122 991 3425X (Printer Mechanism Manual P2906/P2908)  
5122 991 3426X (Printer Mechanism Manual P2907/P2909)





## 20.4. EPSON FX85 / 105

### 20.4.3. Strap Settings / Adjustments Epson FX85 / 105

#### Parallel Interface Dip Switch 1

SWITCH	SETTING	FUNCTION
1	ON * OFF	POWER-ON CONDENSED PRINT POWER-ON PICA SIZE PRINT
2	ON * OFF	ZERO FONT Ø ZERO FONT O
3	ON * OFF	PAPER END DETECT INVALID PAPER END DETECT VALID
4	ON * OFF	ESC/P CONTROL CODES VALID IBM CONTROL CODES VALID
5	ON * OFF	BOLD PRINT NORMAL PRINT

SWITCH			NATIONAL VERSION
6	7	8	
ON	ON	ON	U.S.A.
ON	ON	OFF	FRANCE
ON	OFF	ON	GERMANY
ON	OFF	OFF	U.K. *
OFF	ON	ON	DENMARK
OFF	ON	OFF	SWEDEN
OFF	OFF	ON	ITALY
OFF	OFF	OFF	SPAIN

#### Parallel Interface Dip Switch 2

SWITCH	SETTING	FUNCTION
1	* ON OFF	SELECT IN-N SIGNAL FIXED SELECT IN-N SIGNAL NOT FIXED
2	ON * OFF	SHEETFEEDER CONNECTED NO SHEETFEEDER
3	ON * OFF	1" SKIP-OVER VALID 1" SKIP-OVER INVALID
4	ON * OFF	AUTOMATIC LF WITH CR NO AUTOMATIC LF WITH CR

\* Default Setting

## Serial Interface Dip Switch (on optional board)

SWITCH	SETTING	FUNCTION
SW-1		BAUD RATE, SEE TABLE BELOW
SW-2	ON OFF*	7 BIT WORD 8 BIT WORD
SW-3		BAUD RATE, SEE TABLE BELOW
SW-4		BAUD RATE, SEE TABLE BELOW
SW-5	ON OFF*	EVEN PARITY ODD PARITY
SW-6	ON OFF*	PARITY ENABLED PARITY DISABLED
SW-7		BAUD RATE, SEE TABLE BELOW
SW-8	ON* OFF	SERIAL MODE ENABLED PARALLEL MODE ENABLED

\* Default Setting

Baud Rate Selection Table

BAUD RATE	SW1-1	SW1-3	SW1-4	SW1-7
75	ON	ON	ON	ON
110	ON	OFF	ON	ON
300	OFF	OFF	ON	ON
600	OFF	ON	OFF	ON
1200	OFF	OFF	OFF	ON
2400	ON	OFF	ON	OFF
4800	ON	ON	OFF	OFF
9600	ON*	OFF*	OFF*	OFF*
19200	OFF	ON	ON	OFF

## 20.4.5. Installation / Maintenance Epson FX 85 / 105

### The Printers Self Test

To start the printers Self Test:

Data Quality: press the LF/DRAFT button while switching the power on.

Near Letter Quality: press the FF/NLQ button while switching the power on.

To stop the Self Test:

switch off the printer.

### The Hex Dump Mode

To start the Hex Dump mode:

press both LF/DRAFT and FF/NLQ buttons while switching the printer on.

To stop the Hex Dump mode:

switch off the printer.

## 20.4.6. Diagnostic Functions

AUDIBLE ERROR DETECTION SIGNALS	CAUSE
0 0 0 0 0 0 0 0	An error is detected in a by the slave CPU controlled function, e.g.: Carriage trouble
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Paper end detected
0 0 0 1	An abnormal voltage is detected
1 1 1 1	Short circuited print bead driver transistor(s) (Also the print head may be damaged; check by measuring the print head resistance)

a '1' represents a long tone; a '0' represents a short tone; the space in between represents a pause.

For more information regarding this printer, refer to the following service manuals:-

5122 991 3404X (Printer Technical Manual)

5122 991 3425X (Printer Mechanism Manual P2906/P2908)

5122 991 3426X (Printer Mechanism Manual P2907/P2909)



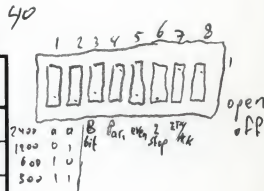


20.5. TEC F10-40 SERIAL

20.5.3. Strap Settings / Adjustments TEC F10-40 Serial

Dip Switch 40

SWITCH	SETTING	FUNCTION
401	--	BAUD RATE, SEE TABLE BELOW
402	--	BAUD RATE, SEE TABLE BELOW
403	ON * OFF	7 BIT WORD 8 BIT WORD
404	* ON OFF	PARITY DISABLED PARITY ENABLED
405	ON * OFF	ODD PARITY EVEN PARITY
406	* ON OFF	1 STOP BIT 2 STOP BITS
407	ON OFF	X-ON / X-OFF PROTOCOL) SEE ETX / ACK PROTOCOL ) NOTE
408	ON	



**NOTE:** Switch 407 is only valid when strap JX on the CPU board is present, the JX strap should be removed when this printer is used with the PC

Baud Rate Selection Table

SWITCH		BAUD RATE
402	401	
ON	ON	300
ON	OFF	600
OFF	ON	1200
OFF	OFF	2400

# Dip Switch 41

41 1 2 3 4 5 6 7 8 9 10

SWITCH	SETTING	FUNCTION
411	ON * OFF	LINE MODE SERIAL MODE
412	ON * OFF	CARRIAGE RETURN + LINEFEED CARRIAGE RETURN ONLY
413	* ON OFF	AUTO SPACE ENABLED AUTO SPACE DISABLED
414	ON OFF	PITCH = 12 CPI PITCH = 10 CPI
415	ON OFF	PROPORTIONAL SPACING NO PROPORTIONAL SPACING
416	--	FORM FEED, SEE TABLE BELOW
417	--	FORM FEED, SEE TABLE BELOW
418	--	FORM FEED, SEE TABLE BELOW
419	--	FORM FEED, SEE TABLE BELOW



\* Default Setting

Form Feed Length Selection Table

4110

FORM LENGTH	SW419	SW418	SW417	SW416
1 INCH	ON	ON	ON	OFF
2	ON	ON	OFF	ON
3	ON	ON	OFF	OFF
4	ON	OFF	ON	ON
5	ON	OFF	ON	OFF
6	ON	OFF	OFF	ON
7	ON	OFF	OFF	OFF
8	OFF	ON	ON	ON
9	OFF	ON	ON	OFF
10	OFF	ON	OFF	ON
11	OFF	ON	OFF	OFF
12	OFF	OFF	ON	ON
13	OFF	OFF	ON	OFF
14	OFF	OFF	OFF	ON
15	OFF	OFF	OFF	OFF

## 20.6. GENERAL PRINTER GP 300PX1 / 300L PX1

### 20.6.3. Strap Settings / Adjustments General Printer GP 300PX1 / 300L PX1

#### Front Panel Switches

To access the front panel switches, remove the cover above the front panel.

PRINT PARAMETER	SETTING	FUNCTION
SW-1		NATIONAL VERSION, SEE TABLE BELOW
SW-2		NATIONAL VERSION, SEE TABLE BELOW
SW-3		NATIONAL VERSION, SEE TABLE BELOW
SW-4		NATIONAL VERSION, SEE TABLE BELOW
SW-5	ON OFF*	ASSH ASF HOPPER 1 MANUAL FEED
SW-6	ON OFF*	LEFT MARGIN 8 LEFT MARGIN 1
SW-7	ON* OFF	HIGH SPEED NORMAL SPEED
SW-8	ON OFF*	DUMP MODE NORMAL

\*: Default settings

NATIONAL VERSION	SW-1	SW-2	SW-3	SW-4
D/A	ON	OFF	OFF	OFF
GB/NL	OFF*	ON*	OFF*	OFF*
F	ON	ON	OFF	OFF
E	OFF	OFF	ON	OFF
I	ON	OFF	ON	OFF
S	OFF	ON	ON	OFF
DK/N	ON	ON	ON	OFF
P	OFF	OFF	OFF	ON
YU/SWF <sup>1)</sup>	ON	OFF	OFF	ON
USA	OFF	ON	OFF	ON
S(SIS)	ON	ON	OFF	ON

<sup>1)</sup>: Depends on character generator version

INTERFACE PARAMETER 1	SETTING	FUNCTION
SW-1	ON OFF*	X-ON/X-OFF READY/BUSY DTR
SW-2	ON OFF*	AUTO STATUS (ASR) NO AUTO STATUS (ASR) YES
SW-3	ON OFF*	PARITY BIT / PARITY ODD <sup>1)</sup> NO PARITY BIT / PARITY EVEN <sup>1)</sup>
SW-4	ON OFF*	DATA BITS 7 DATA BITS 8
SW-5	ON* OFF	PARITY CHECK NO PARITY CHECK YES
SW-6	ON OFF	BAUD RATE, SEE TABLE BELOW
SW-7	ON OFF	BAUD RATE, SEE TABLE BELOW
SW-8	ON OFF	BAUD RATE, SEE TABLE BELOW

<sup>1)</sup>: Depends on setting of switch 5

\*: Default settings

BAUD RATE	SW-6	SW-7	SW-8
19200	ON	ON	ON
9600	OFF*	OFF*	OFF*
4800	ON	OFF	OFF
2400	OFF	ON	OFF
1200	ON	ON	OFF
600	OFF	OFF	ON
300	ON	OFF	ON

INTERFACE PARAMETER 2	SETTING	FUNCTION
SW-1	ON* OFF	12 INCH FORM LENGTH 11 INCH FORM LENGTH
SW-2	ON OFF*	1 INCH SKIP OVER PERFORATION 0 INCH SKIP OVER PERFORATION
SW-3	ON OFF*	LINE SPACING 8 LPI LINE SPACING 6 LPI
SW-4	ON OFF*	FONT 1 FONT 2
SW-5	OFF*	NOT TO BE CHANGED
SW-6	OFF*	NOT TO BE CHANGED
SW-7	OFF*	NOT TO BE CHANGED
SW-8	OFF*	NOT TO BE CHANGED

\*: Default settings

OPTION 1	SETTING	FUNCTION
SW-1	OFF*	NOT USED
SW-2	ON OFF*	AUTO LINE FEED ON AUTO LINE FEED OFF
SW-3	ON OFF*	AUTO CARRIAGE RETURN ON AUTO CARRIAGE RETURN OFF
SW-4	OFF*	GP300.300L
SW-5	ON OFF	PLATEN WIDTH 400 MM PLATEN WIDTH 340 MM
SW-6	OFF*	NOT TO BE CHANGED
SW-7	ON OFF*	TRACTOR FEED ONLY CUT SHEET
SW-8	ON OFF*	PAPER RUN CHECK YES PAPER RUN CHECK NO

\*: Default settings

OPTION 2	SETTING	FUNCTION
SW-1	X	NOT TO BE CHANGED
SW-2	X	NOT TO BE CHANGED
SW-3	X	NOT TO BE CHANGED
SW-4	X	NOT TO BE CHANGED
SW-5	OFF*	NOT TO BE CHANGED
SW-6	OFF*	NOT TO BE CHANGED
SW-7	ON* OFF	PRINT HEAD READY CONTROL ON PRINT HEAD READY CONTROL OFF
SW-8	ON* OFF	COPY SWITCH ENABLED COPY SWITCH DISABLED

\*: Default settings



## 20.6.5. Installation / Maintenance GP300 PX1 / 300L PX1

### The Off Line Printer Test.

To start the Off Line Test:

- Switch the printer ON.
- Press the START/STOP button.
- The START/STOP led must now be lit; if not, press START/STOP again.
- Press simultaneously the F and TEST buttons.
- Press START/STOP; the print head will move to the left, the catch flaps of the inserter will open, the ERROR and the STOP led will be burning.
- Put a sheet of paper in the paper support and press the START/STOP button; the paper will be loaded and the printing will start.

To stop the Off Line Test:

- Press simultaneously the F and TEST buttons.

For more information, refer to CEM 5122 991 3329X.



service information

# | FIELD CHANGE |



system series: P3100/P9000 model: P2938/9 main assy: PCB-CU3-GP nr. P2930-082  
P2934 P2938-018

units affected:

est.inst.time:

title: Upgrade CU3-GP PX1 and CU3-GP P9000.

date: 880824 revised:

note:

this change is: Retrofit on Failure

1. CONDITION : Several problems have been solved, e.g. PR's MSA 034-118 and PC1910.  
Some functions have been changed.  
For detailed description see remarks.

2. CORRECTION : Micro program 24-25 has been changed.

3. <u>REMOVE</u>	IC place	IC	Valid for CU3-
	4	5112 208 0358X	PX1/P9000
	5	5112 208 0359X	PX1/P9000
	6	5112 208 0360X	PX1/P9000
	9	5112 208 0361X	P9000
	12	5112 208 0355X	PX1/P9000
	13	5112 208 0356X	PX1/P9000

4. <u>ADD</u>	IC place	IC	Valid for CU3-
	4	5112 208 04951	PX1/P9000
	5	5112 208 04961	PX1/P9000
	6	5112 208 04971	PX1/P9000
	9	5112 208 04981	P9000
	12	5112 208 04991	PX1/P9000
	13	5112 208 05001	PX1/P9000

5. ADJUSTMENTS : None.

6. PARTS : Proms can be ordered at:

PTDSN B.V.  
Dept.: CS-MM  
Att. Mr. H. Vlottes  
Apeidoorn

7. STATUS CHANGE : PCB CU3-GP PX1:  
12NC 5112 291 99885 becomes 5112 291 99886  
12NC 5112 292 20911 becomes 5112 292 20912  
Service 12NC does not change: 5322 214 40359.

PCB CU3-GP P9000:  
12NC 5112 292 13934 becomes 5112 292 13935  
12NC 5112 292 20941 becomes 5112 292 20942  
Service 12NC does not change: 5322 214 40441.

Responsibility: Mr. T. v. Asselt.

*[Signature]*

revised:

nr. P2930-082  
P2938-018**8. TEST FACILITIES**AFFECTED : None.**9. DOCUMENTS**AFFECTED : Add this info on page 7-17 of CE-Manual  
Pub. no. 5112 991 33294.**10. REMARKS**

: New release micro program 24 -25.

Solved problems.

## I - Part (IC 12, 13)

- Mispositioning with RLF after PRINthead to LEFT STOPPER.
- Mispositioning of characters which must be printed in 2 printpasses when using Front Feed.
- Max. printtime of one line (before time-out) extended from 25 sec. to 100 sec.

## P - Part (IC 4, 5, 6, 9)

- Printer hang-up in high speed mode during printing IBM characters (e.g. vertical bar) which must be printed with 6 lines/inch in 2 print passes (PR MSA 034-118).
- Possible failure when printing characters in 2 print passes in bold.
- Faulty activating of error-led 2 after long positioning commands followed by text.
- Status OUT OF FORM after spaces in 12 cpi on the end of a line.
- Down loading of character generator:
  - a. When down loading Fonts without having installed RAM, the original font structure will be saved.
  - b. Down loaded font with font number 0 will be stored and labelled with the highest possible font number.
  - c. In case the actual selected font will be overwritten during down loading of fonts, the default font will be the actual font now.
- IBM graphic: possible failure with delayed data flow in the internal graphic interface (Esc \*).
- The status OUT OF FORM with scanner graphic will be reported correctly.
- Failure possibility with TABULATION CLEAR.





---

revised:

nr. P2930-082  
P2938-018

Function changes.

- a. In colour printers, inkribbon switching from up to down: black, bleu, red, yellow.
- b. Command SNV, parameter 0 has its own value now, if available it is not equal to parameter 1.
- c. Undefined SGR commands will be ignored.
- d. Incline of printhead will be done just before start of printing and no more immediately after e.g. command SET/RESET MODE HIGH SPEED.

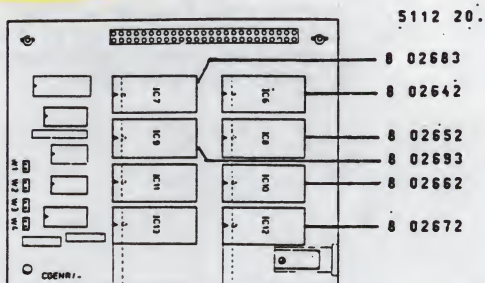


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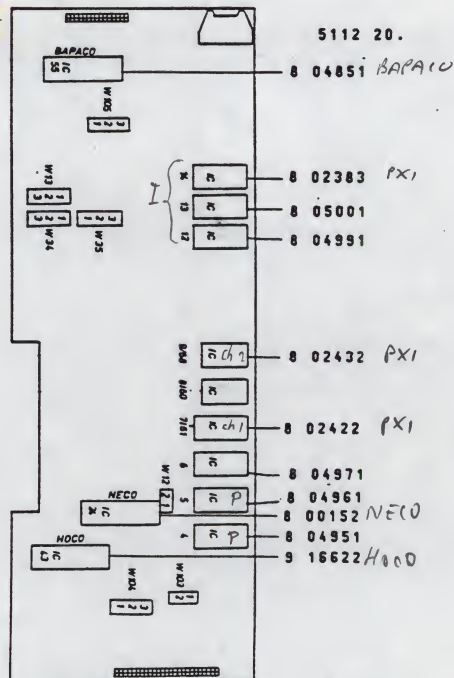
nr. P2930-082  
P2938-018

CU3 / C.GEN. COMBINATION FOR GP300L-PX1 MODEL.

PCB-C.GEN. COMBI IBM 1.0



PCB-CU3-GP PX1



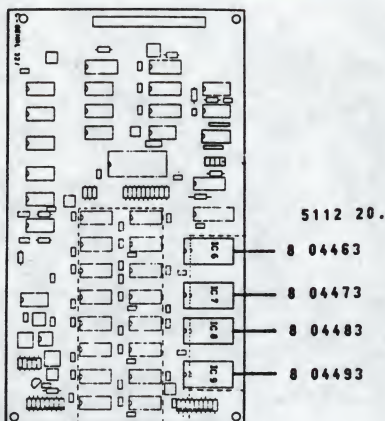


revised:

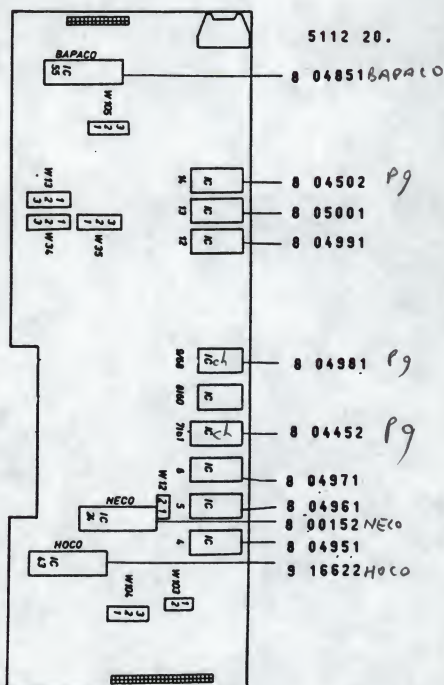
nr. P2930-082  
P2938-018

**CU3 / C.GEN. COMBINATION FOR GP300L-P9000 MODEL.**

PCB-C.GEN.RL  
P9000



PCB-CU3-GP  
P9000





Page 1 of 1

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5. [Illegible text]

6. [Illegible text]

7. [Illegible text]



## 20.7. EPSON FX800 / 1000

### 20.7.3. Strap Settings / Adjustments Epson FX800 / 1000

New settings of the DIP switches only come into effect when the printer is switched on.

Parallel Interface Dip Switch 1

SW 1	SETTING	FUNCTION
1	ON * OFF	POWER-ON CONDENSED PRINT POWER-ON PICA SIZE PRINT
2	ON * OFF	ZERO FONT Ø ZERO FONT O
3	ON OFF	EPSON MODE: GRAPHICS CHAR. TABLE EPSON MODE: ITALIC CHAR. TABLE
	ON * OFF	IBM MODE: AUTO CR INVALID IBM MODE: AUTO CR VALID
4	* ON OFF	IBM MODE EPSON MODE (ESC:P CODES VALID)
5	ON * OFF	NLQ PPRINT QUALITY DRAFT PRINT QUALITY

SWITCH 1			NATIONAL VERSION EPSON MODE (SW1-4 OFF)
6	7	8	
ON	ON	ON	U.S.A.
ON	ON	OFF	FRANCE
ON	OFF	ON	GERMANY
ON	OFF	OFF	U.K. *
OFF	ON	ON	DENMARK
OFF	ON	OFF	SWEDEN
OFF	OFF	ON	ITALY
OFF	OFF	OFF	SPAIN

SWITCH 1			CHARACTER TABLE IBM MODE (SW1-4 ON)
6	7	8	
ON	ON	ON	IBM CHARACTER TABLE 1
ON	ON	OFF	IBM CHARACTER TABLE 2 FOR ALL OTHER SETTINGS

\* Default Setting

## Parallel Interface Dip Switch 2

SW 2	SETTING	FUNCTION
1	* ON OFF	12" PAGE LENGTH 11" PAGE LENGTH
2	ON * OFF	SHEET FEEDER CONNECTED NO SHEET FEEDER CONNECTED
3	ON * OFF	1" SKIP-OVER VALID 1" SKIP-OVER INVALID
4	ON * OFF	AUTOMATIC LF WITH CR NO AUTOMATIC LF WITH CR

## Serial Interface Dip Switch (on optional board)

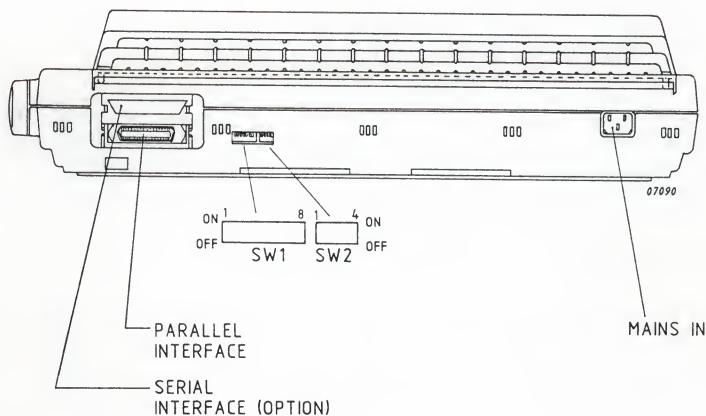
SWITCH	SETTING	FUNCTION
1		BAUD RATE, SEE TABLE BELOW
2	ON * OFF	7 BIT WORD 8 BIT WORD
3		BAUD RATE, SEE TABLE BELOW
4		BAUD RATE, SEE TABLE BELOW
5	ON * OFF	EVEN PARITY ODD PARITY
6	ON * OFF	PARITY ENABLED PARITY DISABLED
7		BAUD RATE, SEE TABLE BELOW
8	* ON OFF	SERIAL MODE ENABLED PARALLEL MODE ENABLED

\* Default Setting

## Baud Rate Selection Table

BAUD RATE	SW1 7	SW1 1	SW1 4	SW1 3
75	ON	ON	ON	ON
110	ON	ON	ON	OFF
300	ON	OFF	ON	OFF
600	ON	OFF	OFF	ON
1200	ON	OFF	OFF	OFF
2400	OFF	ON	ON	OFF
4800	OFF	ON	OFF	ON
9600	OFF	ON	OFF	OFF
19200	OFF	OFF	ON	ON





## 20.7.5. Installation / Maintenance Epson FX 800 / 1000.

### The Printers Self Test.

The Self Test checks:

- The control circuit functions
- The printer mechanism functions
- The print quality
- The DIP switch settings

To start the printers Self Test:

Data Quality: press the LF button while switching the power on.

Near Letter Quality: press the FF button while switching the power on.

When switch 1-4 is ON (IBM mode), in both cases the Sans Serif font will be printed.

To stop the Self Test:

switch off the printer.

### The Hex Dump Mode.

To start the Hex Dump Mode:

press both LF/DRAFT and FF/NLQ buttons while switching the printer on.

To stop the Hex Dump mode:

switch off the printer.



## 20.7.6. Diagnostic Functions Epson FX 800 / 1000.

AUDIBLE ERROR DETECTION SIGNALS	CAUSE
1 1 1 1 1 1	Carriage trouble
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Paper end detected
1 1 1 1 1	An abnormal voltage is detected
1 1 1 1 1 1	RAM error inside the CPU
1 1 1 1 1 1 1 1	RAM error IC 5B
1 1 1 1 1 1 1 1 1 1	RAM error IC 5C

a '1' represents a tone; the space in between represents a pause.

For more information regarding this printer, refer to the following service manual:-

5122 991 3603X (Printer Technical Manual)

## **20.9. QUME SPRINT 11/55**

### **20.9.3. Strap Settings / Adjustments Qume Sprint 11/55**

Refer to FSM 5122 991 3569X for information regarding this printer.

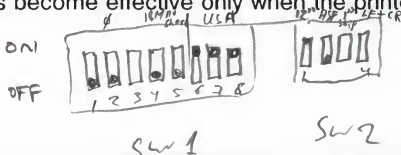


## 20.10. EPSON FX 850 / 1050

### 20.10.3. Strap Settings / Adjustments Epson FX 850 / 1050

New settings of the DIP switches become effective only when the printer is switched on.

#### Dip Switch Bank 1



SW1	SETTING	FUNCTION
SW1-1	ON OFF*	DEFAULT CHAR. SET: USER DEFINED DEFAULT CHAR. SET: ROM
SW1-2	ON OFF*	ZERO FONT Ø ZERO FONT 0
SW1-3	ON OFF	EPSON MODE: GRAPHICS CHAR. TABLE EPSON MODE: ITALIC CHAR. TABLE
	ON* OFF	IBM MODE: AUTO CR INVALID IBM MODE: AUTO CR VALID
SW1-4	ON* OFF	IBM MODE EPSON MODE (ESC/P CODES VALID)
SW1-5	ON OFF*	SHORT TEAR OFF MODE: INVALID SHORT TEAR OFF MODE: VALID

SETTING			NATIONAL VERSION EPSON MODE (SW1-4 OFF)
SW1-6	SW1-7	SW1-8	
ON	ON	ON	U.S.A.
ON	ON	OFF	FRANCE
ON	OFF	ON	GERMANY
ON*	OFF*	OFF*	U.K.
OFF	ON	ON	DENMARK
OFF	ON	OFF	SWEDEN
OFF	OFF	ON	ITALY
OFF	OFF	OFF	SPAIN

SETTING			CHARACTER TABLE IBM MODE (SW1-4 ON)
SW1-6	SW1-7	SW1-8	
ON	ON	ON	IBM CHARACTER TABLE 1
ON*	ON*	OFF*	IBM CHARACTER TABLE 2 FOR THIS AND ALL OTHER SETTINGS *

\* Default Setting

## Dip Switch Bank 2

SW2	SETTING	FUNCTION
SW2-1	ON* OFF	12" PAGE LENGTH 11" PAGE LENGTH
SW2-2	ON OFF*	SHEET FEEDER CONNECTED NO SHEET FEEDER
SW2-3	ON OFF*	1" SKIP-OVER VALID 1" SKIP-OVER INVALID
SW2-4	ON OFF*	AUTOMATIC LF WITH CR NO AUTOMATIC LF WITH CR

## Serial Interface Dip Switch (on optional board)

SWITCH	SETTING	FUNCTION
SW-1		BAUD RATE, SEE TABLE BELOW
SW-2	ON OFF*	7 BIT WORD 8 BIT WORD
SW-3		BAUD RATE, SEE TABLE BELOW
SW-4		BAUD RATE, SEE TABLE BELOW
SW-5	ON OFF*	EVEN PARITY ODD PARITY
SW-6	ON OFF*	PARITY ENABLED PARITY DISABLED
SW-7		BAUD RATE, SEE TABLE BELOW
SW-8	ON* OFF	SERIAL MODE ENABLED PARALLEL MODE ENABLED

\* Default Setting

## Baud Rate Selection Table

BAUD RATE	SW-1	SW-3	SW-4	SW-7
75	ON	ON	ON	ON
110	ON	OFF	ON	ON
300	OFF	OFF	ON	ON
600	OFF	ON	OFF	ON
1200	OFF	OFF	OFF	ON
2400	ON	OFF	ON	OFF
4800	ON	ON	OFF	OFF
9600	ON*	OFF*	OFF*	OFF*
19200	OFF	ON	ON	OFF



## 20.10.5. Installation / Maintenance Epson FX 850 / 1050

### The Printers Self Test

The Self Test checks:

- The control circuit functions
- The printer mechanism functions
- The print quality
- The DIP switch settings

To start the printers Self Test:

Data Quality: press the LF button while switching the power on.

Near Letter Quality : press the FF button while switching the power on.

To stop the Self Test:

switch off the printer.

### The Hex Dump Mode

To start the Hex Dump mode:

press both LF/DRAFT and FF/NLQ buttons while switching the printer on.

To stop the Hex Dump mode:

switch off the printer.

## 20.10.6. Diagnostic Functions Epson FX 850 / 1050.

AUDIBLE ERROR DETECTION SIGNALS	CAUSE
1 1 1 1 1 1	Carriage trouble
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Paper end detected
1 1 1 1 1	An abnormal voltage is detected
1 1 1 1 1 1	RAM error inside the CPU
1 1 1 1 1 1 1 1	RAM error IC 5B
1 1 1 1 1 1 1 1 1 1	RAM error IC 5C
1 1 1 1 1 1 1 1 1 1	Short circuited print head driver transistor(s) (Also the print head may be damaged; check by measuring the print head resistance)

a '1' represents a tone; the space in between represents a pause.

For more information regarding this printer, refer to the following service manual:-

5122 991 3748X (Printer Technical Manual)



## 20.11. GENERAL PRINTER GP 310 / 310F

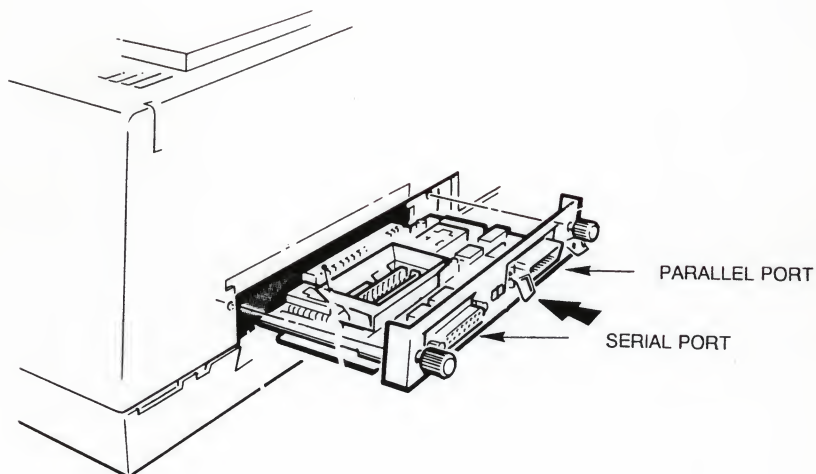
### 20.11.1. Characteristics General Printer GP 310 / 310F

SYSTEM	PERSONALITY MODULE	12NC
P31XX / P32XX	SP2 PX NV-2.5	8707 220 90192
P3400 REL 1	SP1 PX NV-2.8	8707 220 90103
P3400 REL 2	SP1 PX-ML	8707 220 90105

P31XX

S2

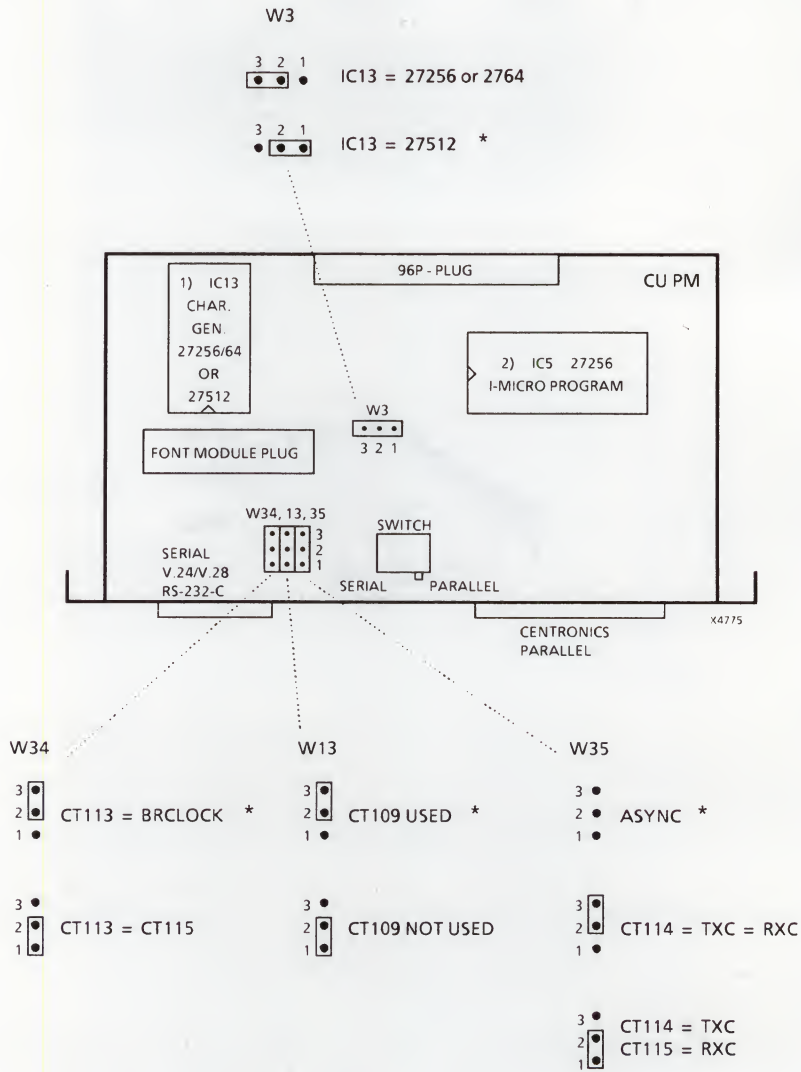
8707 220 90004 LWSJ



20.11.3. Strap Settings / Adjustments General Printer GP 310 / 310F

Strap Settings Personality Module

Board Straps PCB CU-5-F-GP



## Front Panel Switches

The front panel switches are accessed by removing the cover above the front panel.

PRINT PARAMETER	SETTING	FUNCTION
SW-1		NATIONAL VERSION, SEE TABLES BELOW <sup>1)</sup>
SW-2		NATIONAL VERSION, SEE TABLES BELOW <sup>1)</sup>
SW-3		NATIONAL VERSION, SEE TABLES BELOW <sup>1)</sup>
SW-4		NATIONAL VERSION, SEE TABLES BELOW <sup>1)</sup>
SW-5	ON OFF*	ASSH ASF HOPPER 1 MANUAL FEED
SW-6	ON OFF*	LEFT MARGIN 8 LEFT MARGIN 1
SW-7	ON* OFF	HIGH SPEED NORMAL SPEED
SW-8	ON OFF*	DUMP MODE NORMAL

<sup>1)</sup>: Depends on installed Personality Module and on Int. Parameter 2, switch 5

\*: Default settings

Personality Modules SP2 PX NV-2.5 and SP1 PX NV-2.8

Interface Parameter 2 switch 5 (Emulation) OFF:

NATIONAL VERSION	SW-1	SW-2	SW-3	SW-4
IBM SET 1	OFF*	OFF*	OFF*	OFF*
D A	ON	OFF	OFF	OFF
GB NL	OFF	ON	OFF	OFF
F	ON	ON	OFF	OFF
E	OFF	OFF	ON	OFF
I	ON	OFF	ON	OFF
S	OFF	ON	ON	OFF
DK N	ON	ON	ON	OFF
P	OFF	OFF	OFF	ON
YU/SWF <sup>1)</sup>	ON	OFF	OFF	ON
USA	OFF	ON	OFF	ON
SF	ON	ON	OFF	ON

<sup>1)</sup>: Depends on character generator version

Personality Modules SP2 PX NV-2.5 and SP1 PX NV-2.8

Interface Parameter 2 switch 5 (Emulation) ON:

NATIONAL VERSION	SW-1	SW-2	SW-3	SW-4
IBM SET 1	OFF*	OFF*	OFF*	OFF*

Caution: Do not use other settings in this case.



Personality Module SP1 PX-ML, Int. Parameter 2 switch 5 OFF:

NATIONAL VERSION	SW-1	SW-2	SW-3	SW-4
IBM (N = 0)	OFF*	OFF*	OFF*	OFF*
IBM (N = 1)	ON	OFF	OFF	OFF
MULTILINGUAL (N = 2)	OFF	ON	OFF	OFF
MULTILINGUAL (N = 3)	ON	ON	OFF	OFF
ISO 8859.1 (N = 4)	OFF	OFF	ON	OFF

**Note:** Do not use all other settings

Personality Module SP1 PX-ML, Int. Parameter 2 switch 5 ON:

NATIONAL VERSION	SW-1	SW-2	SW-3	SW-4
IBM (N = 0)	OFF*	OFF*	OFF*	OFF*
MULTILINGUAL (N = 1)	ON	OFF	OFF	OFF
ISO 8859.1 (N = 2)	OFF	ON	OFF	OFF

**Note:** All other settings select the IBM character set

For more details, refer to the User Guide, supplied with the Personality Module

INTERFACE PARAMETER 1	SETTING	FUNCTION
SW-1	ON OFF*	X-ON/X-OFF READY/BUSY DTR
SW-2	ON OFF*	AUTO STATUS (ASR) NO AUTO STATUS (ASR) YES
SW-3	ON OFF*	PARITY BIT / PARITY ODD <sup>1)</sup> NO PARITY BIT / PARITY EVEN <sup>1)</sup>
SW-4	ON OFF*	DATA BITS 7 DATA BITS 8
SW-5	ON* OFF	PARITY CHECK NO PARITY CHECK YES
SW-6	ON OFF	BAUD RATE SEE, TABLE BELOW
SW-7	ON OFF	BAUD RATE SEE, TABLE BELOW
SW-8	ON OFF	BAUD RATE SEE, TABLE BELOW

<sup>1)</sup>: Depends on setting of switch 5

\*: Default settings

BAUD RATE	SW-6	SW-7	SW-8
19200	ON	ON	ON
9600	OFF*	OFF*	OFF*
4800	ON	OFF	OFF
2400	OFF	ON	OFF
1200	ON	ON	OFF
600	OFF	OFF	ON
300	ON	OFF	ON

INTERFACE PARAMETER 2	SETTING	FUNCTION
SW-1	ON* OFF	12 INCH FORM LENGTH 11 INCH FORM LENGTH
SW-2	ON OFF*	1 INCH SKIP OVER PERFORATION 0 INCH SKIP OVER PERFORATION
SW-3	ON OFF*	LINE SPACING 8 LPI LINE SPACING 6 LPI
SW-4	ON OFF*	FONT 1 FONT 2
SW-5	ON* OFF	EMULATION ON <sup>1)</sup> EMULATION OFF <sup>1)</sup>
SW-6	X	SEE TABLE BELOW
SW-7	X	SEE TABLE BELOW
SW-8	OFF*	NOT TO BE CHANGED

\*: Default settings

<sup>1)</sup> Refer to tables regarding national version

SW-6	SW-7	FUNCTION
OFF	OFF	XON/XOFF
OFF	ON	ACK/NAK
ON	ON	ENQ/ACK

OPTION 1	SETTING	FUNCTION
SW-1	ON OFF*	\$\$ CONVERSION ACTIVE \$\$ CONVERSION INACTIVE
SW-2	ON OFF*	AUTO LINE FEED ON AUTO LINE FEED OFF
SW-3	ON OFF*	AUTO CARRIAGE RETURN ON AUTO CARRIAGE RETURN OFF
SW-4	ON OFF*	AUTO INSERT ON AUTO INSERT OFF
SW-5	OFF*	NOT TO BE CHANGED
SW-6	OFF*	NOT TO BE CHANGED
SW-7	ON OFF*	TRACTOR FEED ONLY CUT SHEET
SW-8	ON OFF*	PAPER RUN CHECK YES PAPER RUN CHECK NO

\*: Default settings

OPTION 2	SETTING	FUNCTION
SW-1	X	NOT TO BE CHANGED
SW-2	X	NOT TO BE CHANGED
SW-3	X	NOT TO BE CHANGED
SW-4	X	NOT TO BE CHANGED
SW-5	OFF*	NOT TO BE CHANGED
SW-6	OFF*	NOT TO BE CHANGED
SW-7	OFF*	NOT TO BE CHANGED
SW-8	ON OFF*	COPY SWITCH ENABLED COPY SWITCH DISABLED

\*: Default settings

## 20.11.5. Installation / Maintenance GP310 / 310F

### The Off Line Printer Test.

To start the Off Line Test:

- Switch the printer ON.
- Press the START/STOP button.
- The START/STOP led must now be lit; if not, press START/STOP again.
- Press simultaneously the F and TEST buttons.
- Press START/STOP; the print head will move to the left, the catch flaps of the inserter will open, the ERROR and the STOP led will be burning.
- Put a sheet of paper in the paper support and press the START/STOP button; the paper will be loaded and the printing will start.

To stop the Off Line Test:

- Press simultaneously the F and TEST buttons.

For more information, refer to CEM 5122 991 3329X.





## 20.12. NMS 1432

### 20.12.5. Installation / Maintenance NMS 1432

#### The Printers Self Test

To start the printers Self Test:

- Press the LF button while switching the power on.

To stop the Self Test:

- switch off the printer.

**Warning:** The Self Test will only be performed if paper and ribbon are present, and when the initial auto diagnostics have been carried out without signaling an error.

#### The Hex Dump Mode

To start the Hex Dump mode:

- Press the FF button while switching on the printer.

To stop the Hex Dump mode:

- switch off the printer.

#### Programming Print and Interface Parameters

To activate other than the standard settings of Print and Interface Parameters, enter the programming mode by switching the printer on while pressing both LF and FF keys. A self explanatory menu will be printed then.

**Warning:** This procedure cannot be executed with a tractor feed unit or an automatic sheet feeder attached.

### 20.12.6. Diagnostic Functions NMS 1432

When switching on the printer the auto diagnostics are performed. If any faults are encountered, the initialising procedure stops; the fault is signaled as follows:

- Failure led flashing: User correctable error, for example: the carriage can not move.
- Failure led continuously lit: RAM or GATE-ARRAY failure.

Refer to FSM 4822 727 1649X for more information regarding this printer.



## **20.13. NMS 1440 / 1441**

### **20.13.5 Installation / Maintenance NMS 1440 / 1441**

#### **The Printers Self Test**

To start the printers Self Test:

- Press the LF key while switching the power on.

To stop the Self Test:

- switch off the printer.

**Warning:** The Self Test will only be performed if paper and ribbon are present, and when the initial auto diagnostics have been carried out without signaling an error.

#### **The Hex Dump Mode**

To start the Hex Dump mode:

- Press the FF key while switching on the printer.

To stop the Hex Dump mode:

- switch off the printer.

#### **Programming Print and Interface Parameters**

To activate other than the standard settings of Print and Interface Parameters, enter the programming mode by switching the printer on while pressing both LF and FF keys. A self explanatory menu will be printed then.

**Warning:** This procedure cannot be executed with a tractor feed unit or an automatic sheet feeder attached.

### **20.13.6. Diagnostic Functions NMS 1440 / 1441**

When switching on the printer the auto diagnostics are performed. If any faults are encountered, the initialising procedure stops; the error condition is shown by switching all leds of the operator panel on.

Refer to FSM 4822 727 1657X for more information regarding this printer.



## 20.14. NMS 1480/NMS 1481

### 20.14.1. Characteristics NMS 1480/NMS 1481

The NMS 1480 and 1481 are laser printers. The printers have a 36 pins Centronics parallel interface and a serial RS-232C/RS-422 (switchable) interface. The printing speed is 6 pages (A4) per minute. The NMS 1480 and 1481 can emulate the IBM Pro XL, the Epson FX80+ or the HP Laser-Jet Series II (a Diablo 630 emulation cartridge is optional). The printers have standard 512 KB of memory but that is expandable by 1, 2 or 4 MB. The only difference between the two printers is that the NMS 1481 has a special LED indicating the DRUM kits condition.

### 20.14.3. Strapsettings / Adjustments NMS 1480/NMS 1481

On the rear of the printer is a dip switch located (8 switches) to select between RS-232C and RS-422 when using the serial interface.

SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	REMARK
n.u.	n.u.	n.u.	n.u.	n.u. <sup>*)</sup>	OFF	OFF	ON	RS-232C
n.u.	n.u.	n.u.	n.u.	n.u.	ON	ON	OFF	RS-422

n.u. = not used

<sup>\*)</sup> In case of using RS-232C, switching on switch 5, pin 25 of the interface connector will be connected to +5V.

This printer has a menu driven setup program. Via the push keys and the LCD display the setup of the printer can be changed. To enter the setup mode put the printer in OFF LINE mode and press the FUNCTION key.

The FUNCTION key is used to enter and exit the function setting mode.

The DOWN key is used to decrement the function type and the menu selection.

The UP key is used to increment the function type and the menu selection.

The SET key is used to select functions and menu items to be changed.

The RESET key is used to validate the settings made in the function setting mode. Note, however, that interface- or memory size related settings are validated when the printer is turned off then on again.

The settings (functions and menus) are described in the following tables.



## Main Menu

FUNTION	MENU	DESCRIPTION
Paper Set	LTR * LEG A4 B5	Selects the paper size to be used. The specified paper size is used as the format. An error is displayed on the LCD display when the specified paper size and the actual paper size do not match.
Copies	01~99	Selects the number of copies to print.
Auto Cont	ON *  OFF	If the printer has 20 error, 21 error, 22 error, 40 error and paper size error the LCD will indicate error message 10 seconds then clear the error condition by itself. If the printer has above mentioned errors the LCD will indicate error message then keep error condition until RESET key is entered.
Emulation	HPLJ2 * DI630 EPSON IBM PDL	Selects the emulation mode sub menus.
I/F	Parallel * Serial	Selects the interface to be used.
Status PRT	ON OFF *	Selects wether or not to print out the status (different from the test printout).
Power On	ON LINE * OFF LINE	Selects ON LINE or OFF LINE
Data Buffer	1, 2~99	Selects the size of the data buffer in multiples of 1 KBytes.
Over Load	1~10~40	Selects the data buffer overflow value. This parameter is the percentage of the buffer that has to be full before the printer tells the computer to stop.
Buzzer	ON * OFF	Selects whether or not the buzzer will sound when an error occurs.

\* = default

## Emulation submenu (HP Laserjet Series II)

FUNTION	MENU	DESCRIPTION
Font Source	1 * 1 2 S	Selects the default font. The menu shows the position of the font used. 1 and 2 are displayed only when a cartridge is used and S is displayed only when a soft font is downloaded.
Font number	0*99	Selects the default font. The range of font numbers in the menu is determined by the position selected with Font Source.
Form	5-60*128	Selects how many lines can be printed within the text length of the paper.
Symbol	ROMAN8 * IBM-DN IBM-US etc.	Selects symbol sets. 23 symbol sets can be selected from the menu.

\* = default

## Emulation submenu (Diablo630)

FUNTION	MENU	DESCRIPTION
Font Source	1 * 1 2 S	Selects the default font. The menu shows the position of the font used. 1 and 2 are displayed only when a cartridge is used and S is displayed only when a soft font is downloaded.
Font number	0*99	Selects the default font. The range of font numbers in the menu is determined by the position selected with Font Source.
Symbol	ROMAN8 * IBM-DN IBM-US etc.	Selects symbol sets. 23 symbol sets can be selected from the menu.
Spacing	10 cpi * 12 cpi 15 cpi PS	Selects the amount of shift (HMI).
Auto LF	CR + LF CR *	Selects whether or not a line feed code is appended after the carriage return code.
Auto CR	OFF * ON	Selects whether or not a carriage return is to be inserted when the absolute right margin is exceeded.
Top of Form	0-3*12	Selects the TOF position in 1/12 inch units within one inch from the top of the paper.

\* = default

## Emulation submenu (Epson FX-80 + )

FUNTION	MENU	DESCRIPTION
Orientation	Port * Land	Selects the orientation.
Condens	Normal * Condens	Selects the font to be used. Normal : 10 cpi. Condens : 17.1 cpi.
Zero	Unslashed* Slashed	Selects whether or not the zero character is printed with a slash mark.
Intl CG	USA * French etc.	Selects country codes.
Skip-Over	None * 1 inch	Selects skip perforation.
Auto LF	CR + LF CR *	Selects whether or not a line feed code is appended after the carriage return code.
CG Table	Italic * Graphics	Selects the character table assigned to codes 80H to FFH. Graphics : the IBM character set.
Top of Form	0-3"-12	Selects the TOF position in 1/12 inch units within one inch from the top of the paper.

\* = default

## Emulation submenu (IBM Proprinter XL)

FUNTION	MENU	DESCRIPTION
Orientation	Port * Land	Selects the orientation.
Character	Set 1 * Set 2	Selects the print character table to be used.
Zero	Unslashed* Slashed	Selects whether or not the zero character is printed with a slash mark.
Auto LF	CR + LF CR *	Selects whether or not a line feed code is appended after the carriage return code.
Auto CR	LF + CR LF *	Selects whether or not a carriage return code is to be appended after line feed codes.
Top of Form	0-3"-12	Selects the TOF position in 1/12 inch units within one inch from the top of the paper.

\* = default

## Interface submenu (RS-232C/RS-422)

FUNTION	MENU	DESCRIPTION
Baud Rate	19200 9600 * 4800 2400 1200 600 300	Selects the data transfer rate.
Prot	RDY/BSY(H) RDY/BSY(L) XON/XOFF	Selects the protocol.
Data Bit	8 * 7	Selects the number of data bits.
Parity	None * Odd Even Ignore	Selects the parity bit.
Stop Bit	1 * 2	Selects the number of stop bits.
Robust-XON	ON * OFF	Selects Robust-XON.

\* = default

### 20.14.5. Installation / Maintenance NMS 1480/NMS 1481

Connect the printer to the parallel or serial port of the computer and check the printer status.

The NMS 1480 and 1481 have three self-test functions to check the printer status :

- Barber pole pattern printing (press ENVELOPE and MANUAL simultaneously).
- Printing the status of the printer (press UP and DOWN simultaneously).
- Printing the font setting (press ENVELOPE and RESET/CONT simultaneously).



## 20.14.6. Diagnostics Functions NMS 1480/NMS 1481

On the printer is a one line LCD display, which displays printer status messages and error messages.

### Printer status messages

- WAIT Displayed during self-diagnostics or during warming up after turning power on and closing the cover.
- ONLINE LTR Displayed when the printer is ready to receive data.
- OFFLINE LTR Displayed when the printer cannot receive data.
- PROCESSING Displayed while the printer is receiving data, during compiling and while printing. The display changes to ONLINE when printing is complete.
- INITIALIZE Displayed during reset processing.
- SELF PRINT Indicates printer is printing sliding character test.
- FONT PRINT Indicates that the printer is printing out the fonts valid in the selected emulation mode.
- STATUS PRINT Displayed during printing the current status set from the function menu.
- PUSH MANUAL KEY Indicates that the manual key has not been pressed in manual feed mode.

### Error Messages

- PAPER EMPTY Indicates that the printer is out of paper.
- PAPER JAM Indicates a paper jam in the feed unit.
- INSERTION ERROR Indicates a malfunction in the paper pickup from the paper cassette.
- CHANGE DRUM Indicates that the drum unit must be replaced.
- TONER EMPTY Indicates that the toner is low and must be replenished.
- COVER OPEN Indicates that the cover is open.
- FONT CART ERROR Indicates that the cartridge selected for the current font is not inserted.
- PAPER SIZE ERROR Indicates that the paper size setting is not the same as the size of paper loaded in the cassette.
- CPU ERROR Indicates a calculation error in the printer CPU.
- ERROR 10 Indicates an error in the program ROM.
- ERROR 11 Indicates a checksum error for the font cartridge or emulation cartridge (except for HP font cartridges).
- ERROR 12 Indicates a RAM read/write error.
- ERROR 20 Indicates a user-area memory overflow when downloading or storing macros in memory.
- ERROR 21 Indicates that print data overran the printing operation.
- ERROR 22 Indicates that the overrun value set during setup has been exceeded by received data.
- ERROR 30 Indicates a memory error.
- ERROR 31 Indicates a polygon motor synchronism error.



- ERROR 32 Indicates a heater error.
- ERROR 33 Indicates a thermistor error.
- ERROR 40 Indicates that a parity/framing error occurred when using the serial interface.

### Error clear function

10 ERROR, 11 ERROR, 12 ERROR, 30 ERROR, 31 ERROR, 32 ERROR, 33 ERROR will not clear error condition before turning power off.

20 ERROR, 21 ERROR, 22 ERROR, 40 ERROR, PAPER SIZE ERROR have two ways to clear the error condition. If AUTOCONT = ON, the printer indicates the error message 10 seconds then clears the error condition by itself. If AUTOCONT = OFF, the error condition will not be cleared until the RESET key is entered.

PAPER JAM, INSERTION ERROR, CHANGE DRUM, TONER EMPTY, COVER OPEN, PAPER EMPTY and FONT CARTRIDGE ERROR are cleared automatically after the cause of the error is cleared.

Only on the NMS 1481 is a LED indicating the DRUM kits condition (see table).

LED COLOUR	TOTAL COPIES	LCD MESSAGE	INDICATION
Green	0-7500	Non	The DRUM is OK.
Orange	7501-9900	Non	Warning DRUM must be exchanged soon.
Red	9901-10000	Non	Exchange DRUM and DRUM counter.
Red	10001-10090	Change DRUM	The printer stops. Exchange the DRUM and the DRUM counter. Ten copies can be printed each time the ON LINE key is pressed.
Red	10091-10100	Change DRUM	The printer stops. Exchange the DRUM and the DRUM counter. One copy can be printed each time the ON LINE key is pressed.

**NOTE:** Exchange always the DRUM and the DRUM counter together.

For more detailed information about this printer refer to Service Manual.



## 20.15. NMS 1443

### 20.15.5. Installation / Maintenance NMS 1443

#### The Printer's Self Test

To start the printer's Self Test:

- Press the LF button while switching the power on.

To stop the Self Test:

- switch off the printer.

**Warning:** *The Self Test will only be performed if paper and ribbon are present, and when the initial auto diagnostics have been carried out without signalling an error.*

#### The Hex Dump Mode

To start the Hex Dump mode:

- Press the FF button while switching on the printer.

To stop the Hex Dump mode:

- switch off the printer.

#### Programming Machine Parameters

To activate non standard settings, enter the programming mode by switching the printer on while pressing both LF and FF keys.

A self explanatory menu will then be printed.

**Warning:** *This procedure cannot be executed with a tractor feed unit or an automatic sheet feeder attached.*

### 20.15.6. Diagnostic Functions NMS 1443

When switching on the printer, the auto diagnostics are performed. If any faults are encountered, the initialising procedure stops; the fault is signalled by flashing of all the LEDs. Refer to Service Manual 4822 727 16549 for more information about this printer.



# 20.16. NMS 1436/001

Seikosha SP1200

## 20.16.3. Strap Settings / Adjustments NMS 1436/001

SWITCH		MODE
1-1	1-2	
OFF	OFF	MSX
OFF	ON	IBM
ON	OFF	EPSON
ON	ON	PRESTEL

SWITCH	MSX MODE	
	SETTING	FUNCTION
1-3	OFF	NOT USED
1-4	OFF	NOT USED
1-5		SET PAGE LENGTH
1-6		SET PAGE LENGTH
1-7	OFF	NOT USED
1-8	ON OFF*	ENABLE ITALIC DISABLE ITALIC
2-1	ON OFF*	SLASHED ZERO NORMAL ZERO
2-2	ON OFF*	ENABLE 1" PERF. SKIP OVER DISABLE 1" PERF. SKIP OVER

SWITCH		PAGE LENGTH
1-5	1-6	
OFF	OFF	12"*
OFF	ON	8"
ON	OFF	11"
ON	ON	14"

SWITCH	IBM MODE	
	SETTING	FUNCTION
1-3		CHARACTER SET
1-4		CHARACTER SET
1-5		CHARACTER SET
1-6	ON OFF*	PAGE LENGTH = 12" PAGE LENGTH = 11"
1-7	ON OFF*	CR + LF AUTO FEED
1-8	ON OFF*	CHARACTER SET 2 CHARACTER SET 1
2-1	ON OFF*	CSF MODE ENABLED CSF MODE DISABLED
2-2	ON OFF*	ENABLE 1" PERF. SKIP OVER DISABLE 1" PERF. SKIP OVER

SWITCH			COUNTRY
1-3	1-4	1-5	
ON	ON	ON	U.S.A.
ON	ON	OFF	FRANCE
ON	OFF	ON	GERMANY
ON	OFF	OFF	U.K.*
OFF	ON	ON	DENMARK
OFF	ON	OFF	SWEDEN
OFF	OFF	ON	ITALY
OFF	OFF	OFF	SPAIN

\* = Default



SWITCH	EPSON MODE	
	SETTING	FUNCTION
1-3		SELECT CHARACTER SET
1-4		SELECT CHARACTER SET
1-5		SELECT CHARACTER SET
1-6	ON OFF*	PAGE LENGTH = 12" PAGE LENGTH = 11"
1-7	ON OFF*	CR + LF AUTO FEED
1-8	ON OFF*	ENABLE CHARACTER SET DOWNLOADING DISABLE CHARACTER SET DOWNLOADING
2-1	ON OFF*	CSF MODE ENABLED CSF MODE DISABLED
2-2	ON OFF*	ENABLE 1" PERF. SKIP OVER DISABLE 1" PERF. SKIP OVER

SWITCH			COUNTRY
1-3	1-4	1-5	
ON	ON	ON	U.S.A.
ON	ON	OFF	FRANCE
ON	OFF	ON	GERMANY
ON	OFF	OFF	U.K.*
OFF	ON	ON	DENMARK
OFF	ON	OFF	SWEDEN
OFF	OFF	ON	ITALY
OFF	OFF	OFF	SPAIN

SWITCH	PRESTEL MODE	
	SETTING	FUNCTION
1-3		SELECT CHARACTER SET
1-4		SELECT CHARACTER SET
1-5	OFF	NOT USED
1-6	ON OFF*	PAGE LENGTH = 12" PAGE LENGTH = 11"
1-7	ON OFF*	CR + LF AUTO FEED
1-8	ON OFF*	ENABLE CHARACTER SET DOWNLOADING DISABLE CHARACTER SET DOWNLOADING
2-1	ON OFF*	CSF MODE ENABLED CSF MODE DISABLED
2-2	ON OFF*	ENABLE 1" PERF. SKIP OVER DISABLE 1" PERF. SKIP OVER

SWITCH		COUNTRY
1-3	1-4	
OFF	OFF	U.K.*
OFF	ON	ITALY
ON	OFF	SWEDEN
ON	ON	BELGIUM

\* = Default

## 20.16.5. Installation / Maintenance NMS 1436/001

### The Printer's Self Test

To start the printer's Self Test:

- Press the NLQ switch during power on.

To stop the Self Test:

- Press the ON LINE switch or switch off the printer.

**Warning:** *The Self Test will only be performed if paper and ribbon are present, and when the initial auto diagnostics have been carried out without signalling an error.*

### The Hex Dump Mode

To start the Hex Dump mode:

- Press the FF switch during power on.

To stop the Hex Dump mode:

- switch off the printer.

### Printing Of Dip Switch Settings

To print the current settings of dipswitches 1 & 2:

- Press the LF switch during power on.

To stop printing of the dip switch settings:

- Press the ON LINE switch.

## 20.16.6. Diagnostics Functions NMS 1436/001

When switching on the printer, the auto diagnostics are performed. If any faults are encountered, the initializing procedure stops; the fault is signalled by flashing of the Paper Out lamp and the buzzer will sound. Refer to Service Manual 4822 727 16216 for more information about this printer.



## 20.17. NMS 1433

### 20.17.1. Characteristics NMS 1433

The NMS1433 is a 9 pins, 80 columns Impact dot matrix printer. The printer has a 36 pins Centronics parallel interface. The maximum printing speed is 192 characters per second and the maximum amount of characters on a line is 160. The NMS1433 can emulate the IBM Proprinter II or the Epson FX850.

### 20.17.3. Strap Settings / Adjustments NMS 1433

SWITCH	SETTING	FUNCTION
1-1		National character selection
1-2		National character selection
1-3		National character selection
1-4	OFF ON *	Epson FX-850 IBM Proprinter II
1-5	OFF * ON	IBM character set 2 IBM character set 1
1-6	OFF ON *	Page length 12 inch Page length 11 inch
1-7	OFF ON *	LF = LF (IBM only) LF = LF + CR (IBM only)
1-8	OFF * ON	CR = CR (IBM only) Autofeed (Epson only) CR = CR + LF (IBM, Epson only)



SWITCH			COUNTRY
1-1	1-2	1-3	
OFF	OFF	OFF	U.S.A.
OFF	OFF	OFF	ITALY
OFF	ON	OFF	SWEDEN
OFF	ON	ON	DENMARK
ON	OFF	OFF	U.K.
ON	OFF	ON	GERMANY
ON	ON	OFF	FRANCE
ON	ON	ON	SPAIN

SWITCH	SETTING	FUNCTION
2-1	OFF * ON	No 1 inch perforation skip 1 inch perforation skip
2-2		Epson character table selection
2-3		Epson character table selection
2-4	OFF ON *	No slashed zero Slashed zero
2-5	OFF * ON	IBM set 2 Norway/Denmark invalid IBM set 2 Norway/Denmark valid
2-6	OFF * ON	IBM set 2 Portugal invalid IBM set 2 Portugal valid
2-7	OFF * ON	No download buffer Download buffer
2-8	OFF ON	DC1/DC3 selection invalid DC1/DC3 selection valid



SWITCH		TABLE
2-2	2-3	
OFF	OFF	TABLE 1
OFF	ON	TABLE 2
ON	OFF	TABLE 3
ON	ON	TABLE 4

\* = Default



## 20.17.5. Installation / Maintenance NMS 1433

Connect the printer to the parallel port of the computer and check the printer status.

The NMS1433 printer has three self-test functions to check the printer status :

- Test print
- DIP switch settings
- Hex dump printing function

### Test print

This test can be independently conducted by the printer itself and it will test the general operations of the printer.

- Insert paper in the printer and turn the printer off.
- Press and hold the PITCH key while turning on the printer.
- The test pattern continues printing until the POWER switch is turned off.

### Dip Switch Settings

In addition to the test print, the DIP switch settings can be printed.

- Insert paper in the printer and turn the printer off.
- Press and hold the NLQ key while turning on the printer.

### Hexadecimal Dump Printing Function

This function uses the hexadecimal format to print the data received by the printer from the computer.

- Insert paper in the printer and turn the printer off.
- Press and hold the LF/FF key while turning on the POWER switch.
- By comparing the characters printed in the right column with the HEX codes, it can be verified exactly what codes are being sent to the printer. If the code sent is a printable character, that character is printed in the right column. If the code sent is a non-printable character (e.g. a control code), a dot is printed.
- This mode remains valid until the POWER switch is turned off.



Other functions are :

- Automatic printing function
- Automatic paper loading function
- Paper parking function
- Tear off function

### **Automatic Printing Function**

During data input, if the amount of data exceeds 1 line, printing is automatically performed.

During graphic input, if the amount of data exceeds 1 line, neither printing nor line feed is performed. Graphic data that exceeds 1 line is ignored.

### **Automatic Paper Loading Function**

- Turn the POWER switch of the printer on.
- Insert a single sheet of paper or use fanfold paper.
- After inserting the paper pull the paper bail lever from the platen. The sheet of paper is now automatically inserted into the printer. The distance from the top of the form to the first line printed is 1 inch.
- After the paper is loaded push back the paper bail lever.

### **Paper Parking Function**

This function returns fanfold paper to the push tractor position so that cut-sheet paper can be used while keeping fanfold paper in the push tractor position.

- Press the ON LINE key to put the printer off line.
- Press and hold the ON LINE and LF/FF keys. Cut-sheet paper can now be loaded by moving the friction lever to the single sheet position.
- The fanfold paper backs up by maximum 18 inches. If the PAPER OUT indication is not detected (if there was more than 18 inches of fanfold paper in the printer) after this backing up, the PAPER EMPTY lamp will blink 5 times. The printer will now stay in the OFF LINE state.
- Cut-sheet paper can now be loaded by moving the friction lever to the single sheet position.

### **Tear Off Function**

- Press the ON LINE key to put the printer OFF LINE
- Press and hold the LF/FF key for 3 seconds to transport the paper to end of page.
- Tear off the paper.
- Press the ON LINE key to put the printer back into ON LINE state.

## 20.17.6. Diagnostics Functions NMS 1433

On the printer there are 4 indicator lamps :

- Power indicator
- ON LINE indicator
- NLQ indicator
- Paper empty indicator

### Power Indicator

This indicator lights up when power is supplied to the printer.

### On Line Indicator

This indicator lights when the printer is in ON LINE status (ready to receive data) and the indicator is switched off when the printer is in OFF LINE status (unable to receive data).

### NLQ Indicator

This indicator switches on when the printer is in the NLQ mode and off when the printer is in the DRAFT mode. The NLQ indicator flashes when the NLQ sans serif mode is selected.

### Paper Empty Indicator

This indicator will switch on if paper out is detected and the printer enters the OFF LINE state. Insert paper and press the ON LINE key and the printer is in ON LINE state again.

The following errors can occur :

- Home position detection error
- RAM error

### Home Position Detection Error

If home position is not detected during the home detection process, the paper empty indicator flashes with a 0.3 second interval.

### RAM Error

Read/write tests are performed for RAM when the printer is turned on. If a RAM error occurs, the paper empty indicator flashes with 0.1 second (on), 0.1 second (off), 0.3 second (on), 0.3 second (off) intervals.

For more detailed information about this printer refer to Service Manual (12NC : 4822 727 16942).

## **20.18. NMS 1439**

### **20.18.1. Characteristics NMS 1439**

The NMS1439 is a 9 pins, 80 columns Impact dot matrix printer. The printer has a 36 pins Centronics parallel interface. The maximum printing speed is 240 characters per second and the maximum amount of characters on a line is 160. The NMS1439 can emulate the IBM Proprinter XL, the Epson FX800 or the Prestel.

### **20.18.3. Strapsettings / Adjustments NMS 1439**

This printer has its own built-in, menu driven setup program. One of the two setup modes can be entered :

- Standard setup mode
- Quick setup mode

See that there is paper in the printer before turning on the printer and entering one of the setup modes. To enter the standard setup mode turn the power on while pressing and holding the ON LINE key. The ON LINE indicator turns on, the current settings are printed out and function selection mode is selected after the initial function and menu are printed. To enter the quick setup mode turn the power on while pressing and holding the ON LINE and the NLQ key. The difference between the standard and quick setup modes is that in quick setup mode the complete overview of the printer settings will not be printed.

Press the ON LINE key to toggle between Function Selection Mode and Menu Selection Mode.

Press the LINE FEED key to increase function no. or menu no. (depending on what selection mode is selected).

Press the FORM FEED key to decrease function no. or menu no. (depending on what selection mode is selected).

Each time the FORM FEED or LINE FEED key is pressed the applicable menu and function are printed.

To exit the setup mode press the ON LINE and FORM FEED simultaneously.

The settings (functions and menus) are described in the following table.

FUNCT. NO.	FUNTION	MENU NO.	STATUS
01	Emulation	01 * 02 03	IBM Proprinter XL Epson FX800 Prestel
02	Form Length	01 02 03 04 05 06 07 08 09 * 10 11 12 13	3 inches 3.5 inches 4 inches 5.5 inches 6 inches 7 inches 8 inches 8.5 inches 11 inches 11 2/3 inches 12 inches 14 inches 15 inches
03	Line Spacing	01 * 02	1/6 inches 1/8 inches
04	Character Pitch	01 * 02 03 04	10 cpi 12 cpi 17.1 cpi Proportional
05	Print Density	01 * 02	Draft NLQ
06	Power	01 * 02	ON LINE OFF LINE
07	Print Direction	01 * 02	Bi-directional Uni-directional
08	Buffer Full	01 * 02	Line Feed No Line Feed
09	Line Feed On CR-code	01 02 *	Valid Invalid
10	Carriage Return On Line Feed	01 02 *	Valid Invalid
11	Can-Code	01 * 02	Valid Invalid
12	Paper Empty Sensor	01 * 02	Valid Invalid
13	Skip Perforation	01 02 *	Valid Invalid
14	Zero Character	01 * 02	Not Slashed Slashed

(table to be continued)



FUNCT. NO.	FUNTION	MENU NO.	STATUS
15	Selection Of RAM	01 * 02 03	Print Buffer (Input buffer 16 KB) 128 Download Character (Input buffer 14 KB) 256 Download Character (Input buffer 12 KB)
16	ASF (Automatic Sheet Feeder)	01 * 02	Not Installed Installed
17	Tear Off	01 02 *	Valid Invalid
18	Character Set (IBM Mode)	01 * 02	Set 1 Set 2
19	Charater Set 2 (IBM Mode)	01 * 02 03	Normal Portugal Norway/Denmark
20	Character Table (Epson Mode)	01 * 02 03 04	Table 1 Table 2 Table 3 Table4
21	Character Set (Epson Mode)	01 * 02 03 04 05 06 07 08 09 10 11 12 13	American French German British Danish 1 Swedish Italian Spanish 1 Japanese Norwegian Danish 2 Spanish 2 Latin American
22	Font Set (Epson Mode)	01 02 *	Roman Sans Serif
23	Select-In Signal(Epson Mode)	01 02 *	Valid Invalid
24	Autofeed-XT Signal (Epson Mode)	01 02 *	Valid Invalid
25	Character Set (Prestel Mode)	01 * 02 03 04	British Swedish Italian Belgian

\* = default



## 20.18.5. Installation / Maintenance NMS 1439

Connect the printer to the parallel port of the computer and check the printer status.

The NMS1439 printer has four self-test functions to check the printer status :

- Test Print
- Hexadecimal Dump Function
- Print Alignment Adjustment Function
- Carrier Operation Test

### Test Print

- A test print is started by pressing and holding the FORM FEED key while the printer is turned on.
- The test print continues until the printer is turned off.  
LINE FEED key interrupts the printing of the pattern.  
ON LINE continues printing.
- Draft or NLQ printout according to current settings.
- Print pitch according to current settings.

### Hexadecimal Dump Function

This function uses the hexadecimal format to print the data received by the printer from the computer.

- Turn the printer on while pressing and holding the LINE FEED key to start the hexadecimal dump function. The printer enters the ON LINE mode regardless of the current settings.
- This test continues until the printer is turned off.
- Data remaining in the buffer can be printed by pressing the ON LINE key (OFF LINE printing).
- Print format :

XXXX YY YY YY YY YY YY YY YY YY YY YY YY YY YY ZZZZZZZZZZZZZZZZ

XXXX = Address

YY... = Hex data (16 bytes)

ZZZZZZZZZZZZZZZZ = ASCII (16 characters)

### Print alignment adjustment function

- Turn on the printer while pressing and holding the ON LINE key, FORM FEED key and LINE FEED key. Four statuses are printed bidirectionally according to the print alignment adjustment table. The currently selected print alignment adjustment table number is printed after which the printer enters the ready state. Selections can be made according to the following table.

FUNCT. NO.	FUNCTION	MENU NO.	STATUS
98	Alignment	01	
		02	
		03	
		04	
99	Default Setting	01	No
		02	Yes

- Make sure that the line spacing is such that it is possible to determine if there is any discrepancy.
- Select 10 cpi. and draft mode.
- If the printer enters the ready status without printing anything, make sure the head is at the left margin. This makes it easier to see the results of printing.
- The table no. can be changed within "FUNCTION No. 98 ALIGNMENT" by choosing the MENU Selection Mode with the ON LINE key (the key operation is the same as in the setup mode).
- The default setting of the setup is performed with the "FUNCTION No. 99 DEFAULT SETTING".
- To set the default values, select the MENU No. 2 (yes) of the FUNCTION No. 99.
- Press the ON LINE and FORM FEED keys at the same time to complete the setting of this function.

### Carrier Operation Test

The carrier operation test function checks if the carrier is moving smoothly across the entire length of the platen and if both the platen and tractor unit are rotating properly. While carrier operation is being tested, printing cannot be performed.

Procedure :

- After removing any paper loaded in the printer, press and hold the FORM FEED key while turning on the printer.
- The carrier moves from side to side and rotates the platen forward one line (after three moves) when it reaches the left or right edge.
- The test continues until the printer is turned off.

## 20.18.6. Diagnostics Functions NMS 1439

On the printer there are 3 indicator lamps :

- Power indicator
- ON LINE indicator
- NLQ indicator

### Power Indicator

This indicator lights up when power is supplied to the printer.

### On Line Indicator

This indicator lights when the printer is in ON LINE status (ready to receive data) and the indicator is switched off when the printer is in OFF LINE status (unable to receive data).

### NLQ Indicator

This indicator switches on when the printer is in the NLQ mode and off when the printer is in the DRAFT mode.

The following errors can occur :

- Paper Empty Error
- ASF Error
- Cover Open Error
- ROM Error
- RAM Error

### Paper Empty Error

The ON LINE indicator flashes (1 second interval) if there is no paper in the printer. Loading paper causes the OFF LINE status to be selected if there are no other causes for the indicator to blink.

### ASF Error (Automatic Sheet Feeder)

The ON LINE indicator flashes (1 second interval) if the ASF paper is not completely loaded or ejected (only when using ASF paper).

### Cover Open Error

If the printer cover is removed during printing, the printer prints the current line then stops printing. If the printer cover is removed while no printing is being performed, the printer does not start printing.

**ROM Error**

The ON LINE indicator flashes (0.3 second interval) if a ROM checksum error occurs until power supply is turned off.

**RAM Error**

The ON LINE indicator flashes (0.3 second interval) if an error occurs during the RAM read/write test until power supply is turned off.

For more detailed information about this printer refer to Service Manual (12NC : 48822 727 16541).





## **20.19. NMS 1461**

### **20.19.1. Characteristics NMS 1461**

The NMS1461 is a 24 pins, 80 columns Impact dot matrix printer. The printer has a 36 pins Centronics parallel interface. The maximum printing speed is 240 characters per second and the maximum amount of characters on a line is 160. The NMS1461 can emulate the IBM Pro X24, the Epson LQ850 or the NEC P6+.

### **20.19.3. Strapsettings / Adjustments NMS 1461**

This printer has its own built-in, menu driven setup program. One of the two setup modes can be entered :

- Standard setup mode
- Quick setup mode

See that there is paper in the printer before turning on the printer and entering one of the setup modes. To enter the standard setup mode turn the power on while pressing and holding the ON LINE key. The ON LINE indicator turns on, the current settings are printed out and function selection mode is selected. To enter the quick setup mode turn the power on while pressing and holding the ON LINE key and the LQ key. The difference between standard and quick setup mode is that in quick setup mode the complete overview of the printer settings will not be printed. The first setting option presented will be the last setting changed previously.

Press the ON LINE key to toggle between Function Selection Mode and Menu Selection Mode. In function mode the ON LINE indicator is on. In menu mode the ON LINE indicator is off.

Press the LINE FEED key to increase function no. or menu no. (depending on what selection mode is selected).

Press the FORM FEED key to decrease function no. or menu no. (depending on what selection mode is selected).

Each time the FORM FEED or LINE FEED key is pressed the applicable menu and function are printed.

To exit the setup mode press the ON LINE and FORM FEED simultaneously.

The settings (functions and menus) are described in the following table.

FUNCT. NO.	FUNTION	MENU NO.	STATUS
01	Emulation	01 02 * 03	IBM Pro X24 Epson LQ850 NEC P6 +
02	Form Length	01 02 03 04 05 06 07 08 09 10 11 * 12 13	3 inches 3.5 inches 4 inches 5.5 inches 6 inches 7 inches 8 inches 8.5 inches 11 inches 11 2/3 inches 12 inches 14 inches 15 inches
03	Line Spacing	01 * 02	1/6 inches 1/8 inches
04	Line Length	01 02 03 *	20 characters 40 characters 80 characters
05	Character Pitch	01 * 02 03 04	10 cpi 12 cpi 17.1 cpi Proportional
06	Print Density	01 * 02	Draft LQ
07	Power	01 * 02	ON LINE OFF LINE
08	Print Direction	01 * 02	Bi-directional Uni-directional
09	Buffer Full	01 * 02	Line Feed No Line Feed
10	Line Feed On CR-code	01 02 *	Valid Invalid
11	Carriage Return On Line Feed	01 02 *	Valid Invalid
12	Can-Code	01 * 02	Valid Invalid
13	Paper Empty Sensor	01 * 02	Valid Invalid

(table to be continued)

FUNCT. NO.	FUNTION	MENU NO.	STATUS
14	Skip Perforation	01 02 *	Valid Invalid
15	Zero Character	01 * 02	Not Slashed Slashed
16	Selection Of RAM	01 * 02	Print Buffer 32 KB Download Buffer
17	ASF (Automatic Sheet Feeder)	01 * 02	Not Installed Installed
18	Tear Off	01 02 *	Valid Invalid
19	Character Set (IBM Mode)	01 02 *	Set 1 Set 2
20	Charater Set 2 (IBM Mode)	01 * 02 03	Normal Portugal Norway/Denmark
21	AGM mode (IBM) (Alternate Graphic Mode)	01 02 *	Valid Invalid
22	Character Table (Epson NEC Mode)	01 * 02	Italic Graphic
23	Character Set (Epson Mode)	01 * 02 03 04 05 06 07 08 09 10 11 12 13	American French German British Danish 1 Swedish Italian Spanish 1 Japanese Norwegian Danish 2 Spanish 2 Latin American
24	Select-In Signal(Epson NEC Mode)	01 02 *	Valid Invalid
25	Autofeed-XT Signal (Epson NEC Mode)	01 02 *	Valid Invalid

(table to be continued)

FUNCT. NO.	FUNTION	MENU NO.	STATUS
26	Character Set (NEC Mode)	01 *	American
		02	French
		03	German
		04	British
		05	Danish 1
		06	Swedish
		07	Italian
		08	Spanish 1
		09	Japanese
		10	Norwegian
		11	Danish 2
		12	Dutch
		13	Turkish
		14	Spanish 2
		15	Latin American

\* = default

## 20.19.5. Installation / Maintenance NMS 1461

Connect the printer to the parallel port of the computer and check the printer status.

The NMS1461 printer has four self-test functions to check the printer status :

- Test print
- Carrier operation test
- Hexadecimal dump printing function
- Character alignment adjustment

### Test print

The test print function tests the general operations of the printer.

Procedure :

- Insert paper in the printer and turn the printer off.
- Press and hold the FORM FEED key while turning on the printer. Depending on the current settings of the DRAFT/LQ and print pitch a test pattern will be printed.
- Printing of the test pattern continues until the printer is turned off.

### Carrier operation test

The carrier operation test function checks if the carrier is moving smoothly across the entire length of the platen and if both the platen and tractor unit are rotating properly. While carrier operation is being tested, printing cannot be performed.



Procedure :

- After removing any paper loaded in the printer, press and hold the FORM FEED key while turning on the printer.
- The carrier moves from side to side and rotates the platen forward one line (after three moves) when it reaches the left or right edge.
- This test continues until the printer is turned off.

### Hexadecimal Dump Function

This function uses the hexadecimal format to print the data received by the printer from the computer.

Procedure :

- Insert paper in the printer and turn the printer off.
- Press and hold the LINE FEED key while turning on the printer.
- This test continues until the printer is turned off.
- Print format :

XXXX YY YY YY YY YY YY YY YY YY YY YY YY YY YY YY ZZZZZZZZZZZZZZZZ

XXXX = Address

YY ... = Hex data (16 bytes)

ZZZZZZZZZZZZZZZZ = ASCII (16 characters)

### Character alignment adjustment function

- Turn on the printer while pressing and holding the ON LINE key, FORM FEED key and LINE FEED key. Seven statuses are printed bidirectionally according to the print alignment adjustment table. The currently selected print alignment adjustment table number is printed after which the printer enters the ready state. Selections can be made according to the following table.

FUNCT. NO.	FUNCTION	MENU NO.	STATUS
98	Alignment	01	
		02	
		03	
		04	
		05	
		06	
		07	
99	Default Setting	01	No
		02	Yes



- Make sure that the line spacing is such that it is possible to determine if there is any discrepancy.
- Select 10 cpi. and draft mode.
- If the printer enters the ready status without printing anything, make sure the head is at the left margin. This makes it easier to see the results of printing.
- The table no. can be changed within "FUNCTION No. 98 ALIGNMENT" by choosing the MENU mode with the ON LINE key (the key operation is the same as in the setup mode).
- The default setting of the setup is performed with the "FUNCTION No. 99 DEFAULT SETTING".
- To set the default values, select the MENU No. 2 (yes) of the FUNCTION No. 99.
- Press the ON LINE and FORM FEED keys at the same time to complete the setting of this function.

## 20.19.6. Diagnostics Functions NMS 1461

On the printer there are 3 indicator lamps :

- Power indicator
- ON LINE indicator
- LQ indicator

### Power Indicator

This indicator lights up when power is supplied to the printer.

### On Line Indicator

This indicator lights when the printer is in ON LINE status (ready to receive data) and the indicator is switched off when the printer is in OFF LINE status (unable to receive data).

### LQ Indicator

This indicator switches on when the printer is in the LQ mode and off when the printer is in the DRAFT mode.

The following errors can occur :

- Cover Open Error
- Paper Empty Error
- ASF Error
- ROM Error
- RAM Error

### **Cover Open Error**

If the printer cover is removed during printing, the printer prints the current line, then stops printing. If the printer cover is removed while no printing is being performed, the printer does not start printing.

### **Paper Empty Error**

The ON LINE indicator flashes (0.5 second interval) if there is no paper in the printer. Loading paper causes the OFF LINE status to be selected if there are no other causes for the indicator to blink.

### **ASF Error**

The ON LINE indicator flashes (0.5 second interval) if the ASF paper is not completely loaded or ejected (only when using ASF paper).

### **ROM Error**

The ON LINE indicator flashes (0.3 second interval) if a ROM checksum error occurs until power supply is turned off.

### **RAM Error**

The ON LINE indicator flashes (0.3 second interval) if an error occurs during the RAM read/write test until power supply is turned off.

For more detailed information about this printer refer to Service Manual (12NC : 4822 727 16963).



## **20.20. NMS 1467**

### **20.20.1. Characteristics NMS 1467**

The NMS1467 is a 24 pins, 136 columns Impact dot matrix printer. The printer has a 36 pins Centronics parallel interface. The maximum printing speed is 240 characters per second and the maximum amount of characters on a line is 272. The NMS1467 can emulate the IBM Pro XL24, the Epson LQ1050 or the NEC P7 + .

### **20.20.3. Strapsettings / Adjustments NMS 1467**

This printer has its own built-in, menu driven setup program. One of the two setup modes can be entered :

- Standard setup mode
- Quick setup mode

See that there is paper in the printer before turning on the printer and entering one of the setup modes. To enter the standard setup mode turn the power on while pressing and holding the ON LINE key. The ON LINE indicator turns on, the current settings are printed out and function selection mode is selected. To enter the quick setup mode turn the power on while pressing and holding the ON LINE key and the LQ key. The difference between standard and quick setup mode is that in quick setup mode the complete overview of the printer settings will not be printed. The first setting option presented will be the last setting changed previously.

Press the ON LINE key to toggle between Function Selection Mode and Menu Selection Mode. In function mode the ON LINE indicator is on. In menu mode the ON LINE indicator is off.

Press the LINE FEED key to increase function no. or menu no. (depending on what selection mode is selected).

Press the FORM FEED key to decrease function no. or menu no. (depending on what selection mode is selected).

Each time the FORM FEED or LINE FEED key is pressed the applicable menu and function are printed.

To exit the setup mode press the ON LINE and FORM FEED simultaneously.

The settings (functions and menus) are described in the following table.

FUNCT. NO.	FUNTION	MENU NO.	STATUS
01	Emulation	01 02 * 03	IBM Pro XL24 Epson LQ1050 NEC P7 +
02	Form Length	01 02 03 04 05 06 07 08 09 10 11 * 12 13	3 inches 3.5 inches 4 inches 5.5 inches 6 inches 7 inches 8 inches 8.5 inches 11 inches 11 2/3 inches 12 inches 14 inches 15 inches
03	Line Spacing	01 * 02	1/6 inches 1/8 inches
04	Line Length	01 02 03 * 04	20 characters 40 characters 80 characters 136 characters
05	Character Pitch	01 * 02 03 04	10 cpi 12 cpi 17.1 cpi Proportional
06	Print Density	01 * 02	Draft LQ
07	Power	01 * 02	ON LINE OFF LINE
08	Print Direction	01 * 02	Bi-directional Uni-directional
09	Buffer Full	01 * 02	Line Feed No Line Feed
10	Line Feed On CR-code	01 02 *	Valid Invalid
11	Carriage Return On Line Feed	01 02 *	Valid Invalid
12	Can-Code	01 * 02	Valid Invalid

(table to be continued)



FUNCT. NO.	FUNTION	MENU NO.	STATUS
13	Paper Empty Sensor	01 * 02	Valid Invalid
14	Skip Perforation	01 02 *	Valid Invalid
15	Zero Character	01 * 02	Not Slashed Slashed
16	Selection Of RAM	01 * 02	Print Buffer 32 KB Download Buffer
17	ASF (Automatic Sheet Feeder)	01 * 02	Not Installed Installed
18	Tear Off	01 02 *	Valid Invalid
19	Character Set (IBM Mode)	01 02 *	Set 1 Set 2
20	Charater Set 2 (IBM Mode)	01 * 02 03	Normal Portugal Norway Denmark
21	AGM mode (IBM) (Alternate Graphic Mode)	01 02 *	Valid Invalid
22	Character Table (Epson NEC Mode)	01 * 02	Italic Graphic
23	Character Set (Epson Mode)	01 * 02 03 04 05 06 07 08 09 10 11 12 13	American French German British Danish 1 Swedish Italian Spanish 1 Japanese Norwegian Danish 2 Spanish 2 Latin American
24	Select-In Signal(Epson/NEC Mode)	01 02 *	Valid Invalid
25	Autofeed-XT Signal (Epson/NEC Mode)	01 02 *	Valid Invalid

(table to be continued)

FUNCT. NO.	FUNTION	MENU NO.	STATUS
26	Character Set (NEC Mode)	01 *	American
		02	French
		03	German
		04	British
		05	Danish 1
		06	Swedish
		07	Italian
		08	Spanish 1
		09	Japanese
		10	Norwegian
		11	Danish 2
		12	Dutch
		13	Turkish
		14	Spanish 2
		15	Latin American

\* = default

## 20.20.5. Installation / Maintenance NMS 1467

Connect the printer to the parallel port of the computer and check the printer status.

The NMS1467 printer has four self-test functions to check the printer status :

- Test print
- Carrier operation test
- Hexadecimal dump printing function
- Character alignment adjustment

### Test print

The test print function tests the general operations of the printer.

Procedure :

- Insert paper in the printer and turn the printer off.
- Press and hold the FORM FEED key while turning on the printer. Depending on the current settings of the DRAFT/LQ and print pitch a test pattern will be printed.
- Printing of the test pattern continues until the printer is turned off.

### Carrier operation test

The carrier operation test function checks if the carrier is moving smoothly across the entire length of the platen and if both the platen and tractor unit are rotating properly. While carrier operation is being tested, printing cannot be performed.

### Procedure :

- After removing any paper loaded in the printer, press and hold the FORM FEED key while turning on the printer.
- The carrier moves from side to side and rotates the platen forward one line (after three moves) when it reaches the left or right edge.
- This test continues until the printer is turned off.

## Hexadecimal Dump Function

This function uses the hexadecimal format to print the data received by the printer from the computer.

### Procedure :

- Insert paper in the printer and turn the printer off.
- Press and hold the LINE FEED key while turning on the printer.
- This test continues until the printer is turned off.
- Print format :

XXXX YY YY YY YY YY YY YY YY YY YY YY YY YY YY ZZZZZZZZZZZZZZZZZZ

XXXX = Address

YY ... = Hex data (16 bytes)

**ZZZZZZZZZZZZZZZZZZZZ** = ASCII (16 characters)

### Character alignment adjustment function

- Turn on the printer while pressing and holding the ON LINE key, FORM FEED key and LINE FEED key. Seven statuses are printed bidirectionally according to the print alignment adjustment table. The currently selected print alignment adjustment table number is printed after which the printer enters the ready state. Selections can be made according to the following table.

FUNCT. NO.	FUNCTION	MENU NO.	STATUS
98	Alignment	01 02 03 04 05 06 07	
99	Default Setting	01 02	No Yes

- Make sure that the line spacing is such that it is possible to determine if there is any discrepancy.
- Select 10 cpi. and draft mode.
- If the printer enters the ready status without printing anything, make sure the head is at the left margin. This makes it easier to see the results of printing.
- The table no. can be changed within "FUNCTION No. 98 ALIGNMENT" by choosing the MENU mode with the ON LINE key (the key operation is the same as in the setup mode).
- The default setting of the setup is performed with the "FUNCTION No. 99 DEFAULT SETTING".
- To set the default values, select the MENU No. 2 (yes) of the FUNCTION No. 99.
- Press the ON LINE and FORM FEED keys at the same time to complete the setting of this function.

## 20.20.6. Diagnostics Functions NMS 1467

On the printer there are 3 indicator lamps :

- Power indicator
- ON LINE indicator
- LQ indicator

### Power Indicator

This indicator lights up when power is supplied to the printer.

### On Line Indicator

This indicator lights when the printer is in ON LINE status (ready to receive data) and the indicator is switched off when the printer is in OFF LINE status (unable to receive data).

### LQ Indicator

This indicator switches on when the printer is in the LQ mode and off when the printer is in the DRAFT mode.

The following errors can occur :

- Cover Open Error
- Paper Empty Error
- ASF Error
- ROM Error
- RAM Error



### **Cover Open Error**

If the printer cover is removed during printing, the printer prints the current line, then stops printing. If the printer cover is removed while no printing is being performed, the printer does not start printing.

### **Paper Empty Error**

The ON LINE indicator flashes (0.5 second interval) if there is no paper in the printer. Loading paper causes the OFF LINE status to be selected if there are no other causes for the indicator to blink.

### **ASF Error**

The ON LINE indicator flashes (0.5 second interval) if the ASF paper is not completely loaded or ejected (only when using ASF paper).

### **ROM Error**

The ON LINE indicator flashes (0.3 second interval) if a ROM checksum error occurs until power supply is turned off.

### **RAM Error**

The ON LINE indicator flashes (0.3 second interval) if an error occurs during the RAM read/write test until power supply is turned off.

For more detailed information about this printer refer to Service Manual (12NC : 4822 727 16963).





## 20.21. PP 402 (P2942)

### 20.21.1. Characteristics PP 402

The PP 402 is a 24 pins, 136 columns Impact dot matrix printer. The printer has a 36 pins Centronics parallel and a RS-232C/V.24, V.28 serial interface. The maximum printing speed is 280 characters per second and the maximum amount of characters on a line is 272. The PP 402 can emulate the IBM Pro XL24 and the Epson LQ1050. To enlarge the data input buffer an optional 64K RAM board can be installed.

### 20.21.3. Strapsettings / Adjustments PP 402

The PP 402 reads the printer settings from a Configuration Card. This Configuration Card has to be inserted in the front of the printer before the printer is turned on. The settings on this Configuration Card are read during power on of the printer or when the RESET key is pressed.

The Configuration Card enables the following settings :

#### ITALIC (A MODE)

OFF Italics not used.

ON Italics used (items that cannot be printed in italics, such as graphic elements, are excluded).

This option is only effective in emulation A MODE.

#### AGM (I MODE)

OFF Alternate Graphic Mode not used.

ON Alternate Graphic Mode used.

This option is only effective in emulation I MODE.

#### BOLD

OFF Bold character printing not used.

ON Bold character printing used.

#### ZERO STYLE

This specifies whether the character zero is slashed or not.

#### LINE SPACE

1/6" 6 lines per inch.

1/8" 8 lines per inch.

#### CR FUNC.

This function specifies the Carriage Return Function

CR Only Carriage Return.

CR + LF Carriage Return + Line Feed.

## **LF FUNC.**

This function specifies the Line Feed Function

LF            Only Line Feed.

CR + LF    Carriage Return + Line Feed.

## **WRAP AROUND**

CR + LF    Line feed will be performed after automatic printing.

CR           Line feed will not be performed after automatic printing.

When using the parallel interface and A Mode is selected, this function is always

CR + LF regardless of the switch setting.

## **PAPER SENSE**

ON           Paper detection function is effective.

OFF          Paper detection function is not effective.

This specification is ignored when ASF INSTALLED is set to YES.

## **GRAPHICS PRINT DIRECTION**

UNI          Unidirectional printing for such items as graphics and graphic elements.

BI           Bidirectional printing for such items as graphics and graphic elements.

## **EMULATION**

A MODE    Epson LQ1050 emulation mode will be used.

I MODE    IBM Proprinter XL24 emulation mode will be used.

## **1" PERF SKIP**

OFF          1" perforation skip not performed.

ON           1" perforation skip performed.

## **IMMEDIATE PRINTING**

OFF          Immediate printing not performed.

ON           Immediate printing performed.

Immediate printing is to print data buffer data (if present) when no data is input for 0.5 seconds.

## **ASF INSTALLED**

NO           No optional automatic sheetfeeder attached.

YES          Optional automatic sheetfeeder attached (ASF mode).

## **ASF BIN**

1            Only bin 1 will be attached to the ASF.

1 + 2        Bin 1 + 2 will both be attached to the ASF.

This option is only effective in ASF mode.

## **BUFFER**

When optional RAM board is not installed.

LARGE Capacity of data input buffer about 5 KBytes.

SMALL Capacity of data input buffer about 256 Bytes.

When optional RAM board is installed.

LARGE Capacity of data input buffer about 64 KBytes (A mode).

Capacity of data input buffer about 36 KBytes (I mode).

SMALL Capacity of data input buffer about 256 Bytes.

## **DATA BITS**

8 8 bit data length.

7 7 bit data length.

This option is only effective when serial interface is selected.

## **STOP BIT**

1 1 stop bit.

2 2 stop bits.

This option is only effective when serial interface is selected.

## **PARITY**

OFF No parity error detection performed.

ON Parity error detection performed.

This option is only effective when serial interface is selected.

## **PARITY**

EVEN Even parity.

ODD Odd parity.

This option is only effective when serial interface is selected.

## **PARITY ERROR**

DELL Data containing a parity error is ignored.

\*A\* Data containing a parity error is processed as an asterix (\*).

This option is only effective when serial interface is selected.

## **CHARA. SET**

A mode

ITALIC The italic character set is selected.

SET 1 A graphic character set is selected.

SET 2 A graphic character set is selected.

CODE PAGE The code-page character set is selected.

I mode

ITALIC Character set 1 is selected.

SET 1 Character set 1 is selected.

SET 2 Character set 2 is selected.

CODE PAGE The code-page character set is selected.



## **SERIAL PROTOCOL**

ETX/ACK            ETX/ACK protocol.

X-ON/X-OFF 1    X-ON/X-OFF protocol 1.

X-ON/X-OFF 2    X-ON/X-OFF protocol 2.

DTR                DTR protocol.

This option is only effective when serial interface is selected.

## **PARALLEL/SERIAL (BPS)**

PARALLEL    Parallel interface

300            Serial interface with baud rate 300 bps.

600            Serial interface with baud rate 600 bps.

1200           Serial interface with baud rate 1200 bps.

2400           Serial interface with baud rate 2400 bps.

4800           Serial interface with baud rate 4800 bps.

9600           Serial interface with baud rate 9600 bps.

## **TOF ADJUSTMENT**

This specifies the print starting position when the paper is fed. The print starting position is shifted down from the standard print starting position by the distance specified here (0-9\*1/12").

## **NATIONAL VERSION**

This specifies that the character set will be converted according to the selected country. If CODE is selected, the local font can be set by control codes and USA is set when the power is switched on. RESERVED is for expanded functions and cannot be used.



## 20.21.5. Installation / Maintenance PP 402

Connect the printer to the parallel or serial port of the computer and check the printer status. See that the configuration card is put in its slot in the front of the printer before switching on the printer.

The PP 402 printer has three test functions to check the printer status :

- Self Test
- Hexadecimal dump list function
- Print head thermal control

### Self Test

The self test function tests the general operations of the printer.

Procedure :

- Insert paper in the printer and turn the printer off.
- Press and hold the LF key or both the LF and ON LINE switches while turning on the printer. When only the LF key is pressed during turning on the printer draft characters will be printed. When both the LF and ON LINE key are pressed during turning on the printer LQ characters will be printed.
- Printing of the test pattern continues until the ON LINE key is pressed.

### Hexadecimal Dump List Function

This function uses the hexadecimal format to print the data received by the printer from the computer.

Procedure :

- Insert paper in the printer and turn the printer off.
- Press and hold the FF key while turning on the printer.
- This test continues until the printer is turned off or the RESET key is pressed or the INITIAL signal is input.
- Print format :

XXXX YY YY YY YY YY YY YY YY YY YY YY YY YY YY YY ZZZZZZZZZZZZZZZZZZ

XXXX = Address

YY... = Hex data (16 bytes)

ZZZZZZZZZZZZZZZZZZ = ASCII (16 characters)

### Print Head Thermal Control

If the print head temperature exceeds a certain level, printing automatically stops to protect the print head from overheating. This state continues until the temperature goes below the certain level. During this period, the ON LINE and P. EMP (Paper Empty) indicators blink alternately at 0.3 second intervals.

## 20.21.6. Diagnostics Functions PP 402

On the printer there are 3 indicator lamps :

- Power indicator
- ON LINE indicator
- P. EMP (Paper Empty) indicator

### Power Indicator

This indicator lights up when power is supplied to the printer.

### On Line Indicator

This indicator lights when the printer is in ON LINE status (ready to receive data) and the indicator is switched off when the printer is in OFF LINE status (unable to receive data).

### P. EMP Indicator

When there is no paper in the printer anymore the Paper Empty indicator remains on.

The following errors can occur :

- Home Sense Error
- Standard RAM Error
- Optional RAM Error
- ASF Error

### Home Sense Error

Buzzer sounds and P. Emp indicator flashes (interval 0.3 second) when a home sense error is detected.

### Standard RAM Error

Buzzer sounds and P. Emp indicator flashes (0.1 sec. ON/OFF, 0.3 sec. ON/OFF, 0.1 sec. ON/OFF, 0.3 sec. ON/OFF etc.) when a standard RAM error is detected.

### Optional RAM Error

Buzzer sounds and P. Emp indicator flashes (0.1 sec. ON/OFF, 0.1 sec. ON/OFF, 0.3 sec. ON/OFF, 0.1 sec. ON/OFF, 0.1 sec. ON/OFF, 0.3 sec. ON/OFF etc.) when an optional RAM error is detected.

### ASF Error

When an automatic sheet feeder error is detected the buzzer sounds for 1 second and the P. Emp indicator switches on.

For more detailed information about this printer refer to the Service Manual.

## **20.22. PP405 (P2945)**

### **20.22.1. Characteristics PP405**

The PP405 is a 24 pins, 136 columns impact dot matrix printer. The printer, equipped with the standard Personality Module PP405-101, has a 36 pins Centronics parallel interface and a RS-232C/V.24, V.28/RS422 serial interface. The maximum printing speed is 600 characters per second (draft) and 330 characters per second (NLQ) and 165 characters per second (LQ). The PP405 can emulate the Philips GP and the IBM Proprinter. The standard Personality Module has a great number of character sets available:

ASCII, ISO-7 bit, IBM-PC and -PC2 (multilingual)  
with 11 national versions, ISO 8859/1 (for Unix and Xenix)  
Teletex 1.0.

### **20.22.3. Strapsettings / Adjustments PP405**

The correct mains input voltage has to be checked and if necessary adjusted at the rear of the printer (just below the mains input connector). Selectable voltages are 230V or 115V.

All straps on the printed circuit boards inside the PP405 (P2945) are factory set.

All other functions and parameters are set via the operator panel with the MENU FUNCTION. These settings must comply with the data in the system printer model and interface file.

#### **MENU FUNCTION**

The MENU mode is entered by pushing MENU on the operator panel when in STOP mode. The MENU is structured in three levels:

- Main Function, this is the highest level
- Item
- Value of the item, this is the lowest level.

A number of Value settings are summarised into a 'Macro'. There are four Macros available, each with a different summary of Value settings.

Via the MENU mode the Macro can be modified and a Macro can be made active.

Refer to the Reference Manual for the structure of the MENU mode. The owner of the printer receives the Reference Manual together with the Personality Module.



## Operator Panel

### 16-Character LCD display

Shows normally the current status of the printer. If an error occurs, the resulting error message overrides the displayed message.

### POWER ON (green)

Indicates that power is supplied to the printer.

### STOP (yellow)

Indicates that the printer is in the STOP mode. The printer enters the STOP mode when pushing the START/STOP key or when an error condition occurs.

### Function keys

The top row of keys (4) is used to enter the MENU mode where parameters concerning the interface, character attributes, margins, print modes, etc. are selected.

### EJECT Key

The EJECT key is used to eject the printed sheet/form from the print station.

### PAPER FEED Key

The PAPER FEED key is used to move the paper 1/90 inch (0.28mm) in the direction of the arrows (forwards). Holding down the key gives a continuous paper feeding.

### REVERSE PAPER FEED Key

The REVERSE PAPER FEED key is used to move the paper 1/90 inch (0.28mm) in the direction of the arrows (reverse). Holding down the keys gives a continuous paper feeding.

### START/STOP Key

The START/STOP key alternates between START mode and STOP mode.

Pressing STOP:

- Turns on the STOP indicator
- Stops all printing and paper handling operations
- Causes the interface to change to LOCAL
- Enables all other function keys.

Pressing START:

- Switches off the STOP indicator
- Makes the printer ready for operation
- Either starts the printout or self-test functions when selected (via the MENU mode), or causes the interface status to change to ONLINE READY
- Exits from the MENU mode.

## 20.22.5 Installation / Maintenance PP405

For the installation rules, see the Owner's Manual. Each printer is delivered with an up to date Owner's Manual. Use this manual and keep it with the printer.

In rough steps, the installation procedure consists of:

- Unpack the printer.
- Remove the transport lock, a clip used to lock the print head drive belt.
- Install the Personality Module.
- Select the correct mains input voltage.
- Install the ink ribbon cassette.
- Install the Automatic Sheet Feeder(s) if present.
- Install the output stacker.
- Install the paper.
- Prepare the printer settings via the Operator Panel, save them.
- Switch on the printer (switch is at the left rear) and test it via its built-in tests selectable via the menu mode (see the Owner's Manual).
- Switch off the power to the printer and connect the interface cable to the system.
- Switch on the printer and test the printer via the available system print commands.

Preventive maintenance is described in the owners manual. It can be done by the user/owner, and should be done every six months or 50,000 prints, whichever occurs first.

The preventive maintenance actions are:

- Remove the top cover.
- Thoroughly brush and vacuum clean all accessible areas to remove paper flock and dust.
- Clean the platen surface, the paper pressure rollers using the platen cleaner (Philips Platen Cleaner C/CP09 8709 004 10931).
- Clean the covers and the operator panel with a damp, clean lint free cloth.
- Remount the top cover.

Replacement of wearing parts is recommended to be done every 200000 pages.

Wearing parts:

- |                                   |                |
|-----------------------------------|----------------|
| - printhead                       | 8707 240 90861 |
| - platen assy                     | 8707 240 90802 |
| - pick-up rolls for ASF cassettes | 8707 240 90821 |



## 20.22.6 Diagnostics PP405

### Testing the printer

The printer logic is tested immediately after power on. The print functions can be tested via:

- MENU mode (see below)
- Printer Diagnostic programs
- Application print commands and print utilities

#### MENU mode:

- Go with the START/STOP button to the "local state" and enter the menu mode by pressing the MENU button.
- Use the arrow-down or arrow-up key to scroll through the menu to SELF TEST. Select SELF TEST by pressing the arrow-right key.
- Use the arrow-down or arrow-up key to scroll through the test possibilities:
  - PRINT TEST 1: shift pattern
  - PRINT TEST 2: "Dr. Grauert" test
  - PRINT TEST 3: Technical release/level of the printer is printed.
  - I/F TEST: Serial interface test (Loop back connector required)
- Select the test by pressing the arrow-right key (\* is displayed now)
- Press START/STOP. (LOAD MANUAL is displayed to indicate that paper should be inserted manually now).
- Insert a sheet of paper manually and press the START/ STOP button to start the test.
- Press START/STOP again at the end of the test.
- Go with the arrow keys to the next function or return to local (twice arrow-left key).

#### PRINT OUT

With the MENU selection PRINT OUT the current status as well as all the four macro definitions of the printer (settings) can be printed.

#### HEX DUMP

With the MENU selection HEX DUMP a hexadecimal dump mode can be selected. When started with the START/STOP key the printer already prints the header of the page and then waits for input data to be printed hexadecimally.

## STATUS and ERROR messages

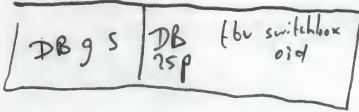
The following messages are displayed if a condition exists which prevents normal operation of the printer.

<b>LOCAL</b>	Entered when START/STOP key was pressed. STOP indicator is lit as well.
<b>COVER OPEN</b>	Displayed when the top cover is open and the printer is in READY or BUSY mode.
<b>LOAD BIN ...</b>	Displayed whenever a form feed command or a print command is given by the host to a selected ASF cassette which is empty.
<b>LOAD TRACTOR</b>	Displayed whenever a form feed command is given by the host, the tractor is the selected paper source and there is no fanfold paper. The printer enters the STOP mode.
<b>LOAD MANUAL</b>	As per LOAD TRACTOR, except that the printer does not enter the STOP mode. Paper should be fed manually. The printer will accept paper and commence printing
<b>PAPER JAM TRF</b> <b>PAPER JAM ASF</b>	Displayed if eject forms fails in ASF. For tractor feed if successive line feeds fail to move fanfold paper correctly.
<b>TEAR OFF PAPER</b>	Displayed if current paper source is TRACTOR but different is then selected. Operator must 'tear off' the fanfold paper along the back edge of the printer (paper should be torn off from the left to the right). Press the START key to enable the fanfold paper to be fed backwards to a park position, and the newly selected paper source to be used. Failure to tear off paper will cause the printer to enter the STOP mode and to continue to display TEAR OFF PAPER.



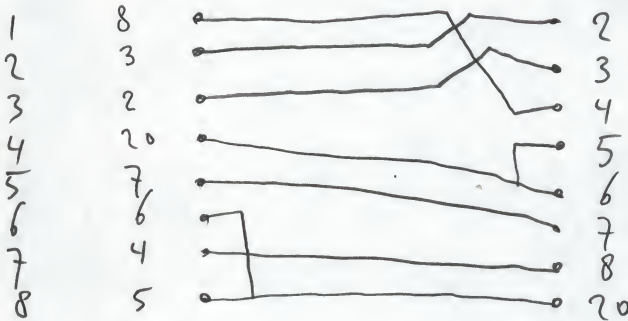
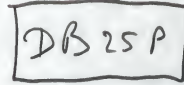
# HP 7475 A plotter

special cable



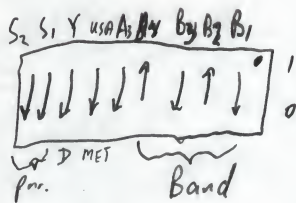
special cable

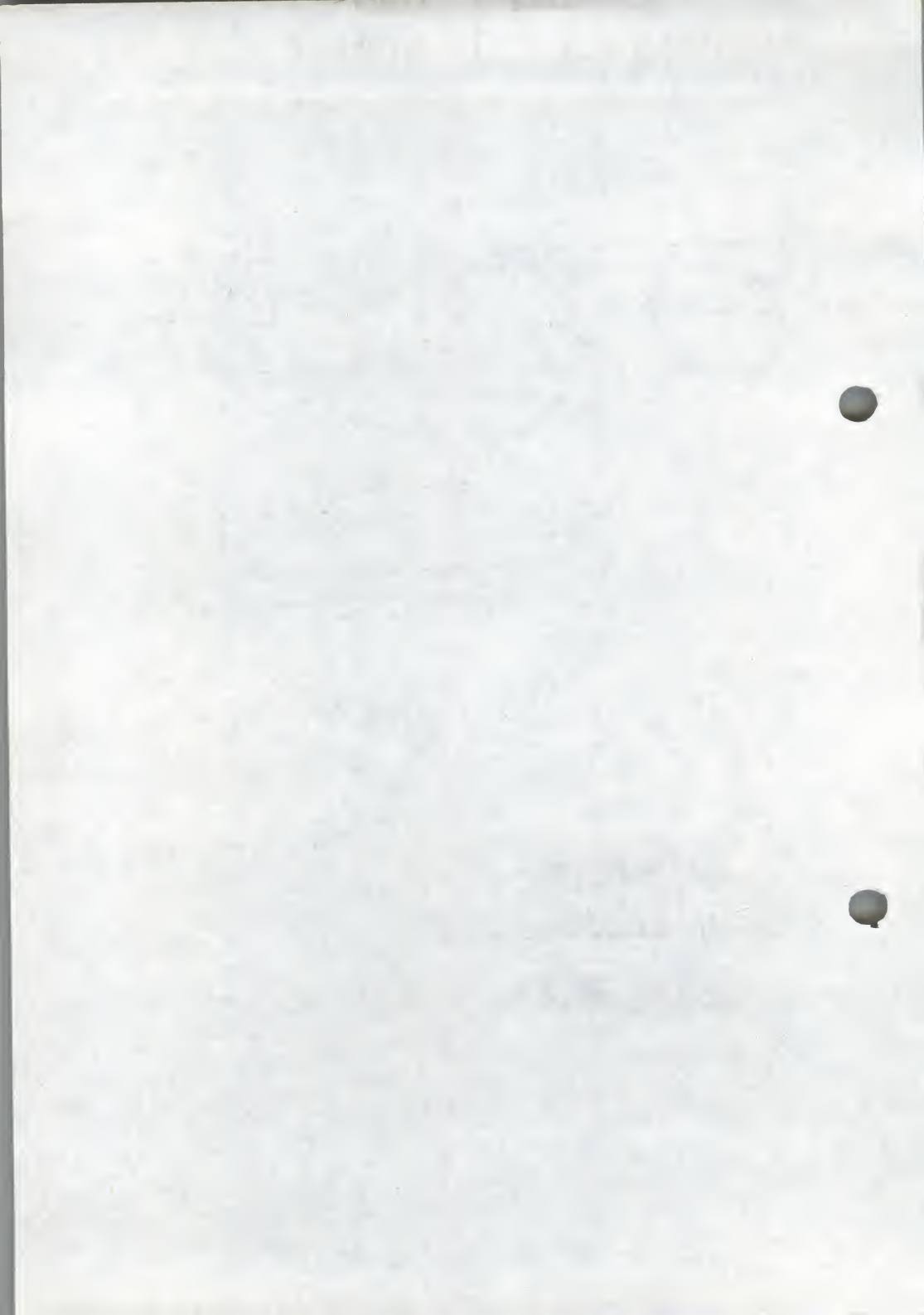
HP 7475



fbu Harvard Graphics

gboo bd  
no par.  
8 bits  
1 stop







## 21. VISUAL DISPLAY UNITS

Section:

Page:

1: Technical Overview	21.1-1
1.1: Option Cross Reference Guide	21.1-1
1.2: Technical Data	21.1-2

2: Philips Monochr. 325 P2723-30x (M12/325)	21.2-1	21.2-2	n.a.	21.2-3	21.2-3	n.a.
3: Amdek / Sampo Monitor	21.3-1	21.3-2	21.3-2	21.3-3	21.3-3	n.a.
4: Tatung Colour P2725-100 (CM-1322P)	21.4-1	21.4-1	n.a.	n.a.	21.4-3	n.a.
5: Philips Monochr. 400 P2724-30x (M12/400)	21.5-1	21.5-2	n.a.	n.a.	21.5-3	n.a.
6: Philips Monochr. 350 P2722-xxx 7BM5x3	21.6-1	21.6-1	n.a.	n.a.	21.6-3	n.a.
7: Sampo Enhanced Col. P2728-200	21.7-1	21.7-2	n.a.	n.a.	21.7-4	
8: Terminal P2706-0xx	21.8-1	21.8-2	21.8-3	n.a.	21.8-5	21.8-8
9: Philips FSQ Mono. 350 BM77x3 / BM79x3 7BM7x3 / 7BM9x3	21.9-1	21.9-2	n.a.	21.9-4	21.9-4	n.a.
10: Philips FSQ Colour CM9053 / CM9073 9CM053 / 9CM073	21.10-1	21.10-2	n.a.	21.10-4	21.10-4	n.a.
11: Philips Monochrome 7BM749/7BM949 (VGA)	21.11-1	21.11-2	n.a.	21.11-4	21.11-4	21.11-4
12: Philips Colour 9CM082/ 3CM9809 / 3CM9609 (VGA)	21.12-1	21.12-2	n.a.	21.12-4	21.12-4	21.12-4

Subsection:

- 1 Characteristics \_\_\_\_\_
- 2 Connections \_\_\_\_\_
- 3 Strap Settings / Adjustments \_\_\_\_\_
- 4 Modification History \_\_\_\_\_
- 5 Installation / Maintenance \_\_\_\_\_
- 6 Diagnostic Functions \_\_\_\_\_

**NOTE:** n.a. means that this section is not available for this unit.

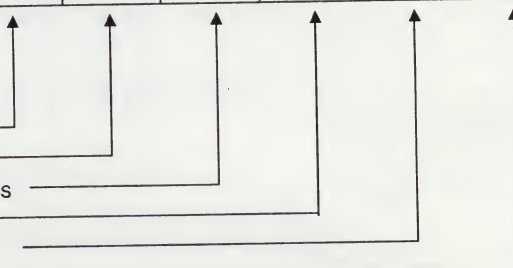
Section:

Page:

13: Philips Colour 8CM852 (CGA)	21.13-1	21.13-1	n.a.	n.a.	21.13-3	n.a.
14: Multi-frequency Colour 8CM875 (VGA)	21.14-1	21.14-1	n.a.	n.a.	21.14-3	n.a.
15: Autoscans Colour 4CM4270 (VGA)	21.1-6	n.a.	n.a.	n.a.	n.a.	n.a.
16: Autoscans Colour 4CM4280 (VGA)	21.1-6	n.a.	n.a.	n.a.	n.a.	n.a.
17: Autoscans Colour 4CM6089 / 6099 (VGA)	21.1-7	n.a.	n.a.	n.a.	n.a.	n.a.
18: VGA Colour 6CM3209 / 6CM3279	21.1-8	n.a.	n.a.	n.a.	n.a.	n.a.
19: VGA Colour 7CM3209 / 7CM3279	21.1-8	n.a.	n.a.	n.a.	n.a.	n.a.
20: VGA Colour 7CM3689	21.1-9	n.a.	n.a.	n.a.	n.a.	n.a.
21: VGA Colour 8CM3279	21.1-10	n.a.	n.a.	n.a.	n.a.	n.a.
22: VGA Colour 8CM3289	21.1-10	n.a.	n.a.	n.a.	n.a.	n.a.

Subsection:

- 1 Characteristics
- 2 Connections
- 3 Strap Settings / Adjustments
- 4 Modification History
- 5 Installation / Maintenance
- 6 Diagnostic Functions



**NOTE:** n.a. means that this section is not available for this unit.

## 21.1. TECHNICAL OVERVIEW

### 21.1.1. Option Cross Reference Guide

OPTION	P 2 1 2 0	P 2 2 3 0	A V E N G	P31xx				P32xx					P33xx							P 3 4 6 4	P 3 4 0 0	P91xx								
				0	0	0	2	0	0	0	0	3	3	0	0	4	4	5	6			6	7	0	3	3	6	6	7	0
				1	2	2	5	0	0	0	2	4	0	8	1	2	5	8	0			0	1	0	4	0	5	0	5	0
2: Philips Monochr.325 P2723-30x (M12/325)				x																										
3: Amdek / Sampo Monitor				x																										
4: Tatung Colour P2725-100 (CM- 1322P)				x	x	x	x		x	x	x																			
5: Philips Monochr.400 P2724-30x (M12/400)					x	x																								
6: Philips Monochr.350 P2722-xxx 7BM5x3	x	x					x		x	x	x			x	x							x	x		x					
7: Sampo Enhanced Col. P2728-200	x	x		x	x	x	x		x	x	x											x								
8: Terminal P2706-0xx	x	x																				x	x		x					
9: Philips FSQ mono. 350 BM77x3 / BM79x3 7BM7x3 / 7BM9x3		x	x					x	x	x	x	x	x	x	x								x	x		x				
10: Philips FSQ Colour CM9053 / CM9073 9CM053 / 9CM073	x	x		x	x	x	x	x	x	x	x	x	x	x	x								x	x		x				
11: Philips Monochrome 7BM749 / 7BM949 (VGA)			x					x				x		x	x		x	x		x		x	x	x	x	x				
12: Philips Colour 9CM082/3CM9809/ 3CM9609 (VGA)			x					x				x		x	x		x	x		x		x	x	x	x	x				
13: Philips Colour 8CM852 (CGA)	x											x																		
14: Philips Colour 8CM875 (VGA)															x		x	x		x		x	x	x	x	x				

## 21.1.2. Technical Data

	PHILIPS MONOCHROME 325 P2723-30x (M12/325)	AMDEK / SAMPO MONITOR	TATUNG COLOUR P2725-100 (CM-1322P)
PICTURE TUBE			
Size	12"	12"	13"
Phosphor	P31	P31	
EHT (KV)	12.5		25
SCREEN IMAGE SIZE (MM)	210 + - 4 (width)x 160 + - 4 (height)		248 + - 6 X 170 + - 5
RESOLUTION	1000 pixels (centre) 850 pixels (corner)		
CHARACTER MATRIX			
DISPLAY FORMAT			
VIDEO BANDWIDTH	25 MHz		15 MHz
HOR. SCAN FREQ.	25.814 KHz	18.431 KHz	15.750 (CGA)
VERT. SCAN FREQ.	60 Hz	50 Hz	50 60 Hz
CONNECTIONS	TTL (vid.int)	TTL (vid.int)	TTL (RGBI)
POWER SUPPLY			
Voltages	115/230 V	120/220 V	90-240 V
Consumption	33 W	32 W	70 W
USER CONTROLS			
Front	Power, Bright. Contrast	Power, Bright. Contrast	Power, Bright, Contrast
Rear	Vert. Hold Vert. Size Hor. Phase	Vert. Hold Hor Hold	Vert. Hold Vert. Size
DIMENSIONS WEIGHT			
Width (mm)	305		395
Height (mm)	304		297
Depth (mm)	276		400
Weight (kg)		8.9	12



	<b>PHILIPS MONOCHROME 400 P2724-30x (M12/400)</b>	<b>PHILIPS MONOCHROME 350 P2722-xxx 7BM523</b>	<b>SAMPO ENHANCED COLOUR P2728-200</b>
<b>PICTURE TUBE</b>			
Size	12"	12"	13"
Phosphor	P31	LA	P22
EHT (KV)	12.5	12.5	22
<b>SCREEN IMAGE SIZE (MM)</b>	210 +/- 4 (width)x 160 +/- 4 (height)	210 +/- 4 X 160 +/- 4	248 +/- 6 (width)x 160 +/- 5 (height)
<b>RESOLUTION</b>	1000 pixels (centre) 850 pixels (corner)	850 pixels at centre	
<b>CHARACTER MATRIX</b>			
<b>DISPLAY FORMAT</b>			
<b>VIDEO BANDWIDTH</b>	25 MHz	20 MHz	18 MHz
<b>HOR. SCAN FREQ.</b>	25.814 KHz	18.432 KHz	15.750 (CGA) 21.849 (EGA)
<b>VERT. SCAN FREQ.</b>	60 Hz	50 Hz	60 Hz
<b>CONNECTIONS</b>	TTL (vid.int)	TTL (vid.int)	TTL (R/G/B;r/g/b)
<b>POWER SUPPLY</b>			
Voltages	110/220/240V +/- 10%	110/220/240V +/- 10%	120/220 V
Consumption	33 W	30 W	110 W
<b>USER CONTROLS</b>			
Front	Power, Bright. Contrast	Power, Bright. Contrast	Power, Bright, Contrast
Rear	Vert. Hold Vert. Size Hor. Phase	Vert. Hold Vert. Size Hor. Phase	Vert. Hold Vert. Size Hor. Phase
<b>DIMENSIONS/WEIGHT</b>			
Width (mm)	305	305	400
Height (mm)	276	276	300
Depth (mm)	303	303	420
Weight (kg)	6.4	6.4	13.6



	TERMINAL P2706	PHILIPS FSQ MONOCHROME 350 BM77x3 / BM79x3 7BM7x3 / 7BM9x3	PHILIPS FSQ COLOUR CM9053 / CM9073 9CM053 / 9CM073
PICTURE TUBE			
Size	14"	14" (7BM7x3) 12" (7BM9x3)	14"
Phosphor	Amber P134	Green P31 (7BM..13) Amber LA (7BM..23)	
EHT (KV)	25	14.5 (7BM7..) 12.5 (7BM9..)	24
SCREEN IMAGE SIZE (MM)	237 +/- 2 X 172 +/- 2		
RESOLUTION	800 (80 col.) 1188 (132 col) 416 lines	hor.: 920 pixels vert.: 350 lines	640 x 200 (CGA) 640 x 350 (EGA)
CHARACTER MATRIX	7 x 12 / 5 x 7		
DISPLAY FORMAT	hor : 80 or 132 col. ver : 26 or 44 rows		
VIDEO BANDWIDTH		22 MHz	
HOR. SCAN FREQ.		18.432 KHz	15.750 (CGA) 21.849 (EGA)
VERT. SCAN FREQ.	60 Hz	50 Hz	50/60 Hz
CONNECTIONS	V24 (MODEM, AUX) keyboard	TTL (video.intent.)	TTL (R'G'B/r.g.b)
POWER SUPPLY			
Voltages	110/220/240V +/- 10%	110/220/240V	190-264V
Consumption	45 W	33 W (7BM7..) 32 W (7BM9..)	85 W
USER CONTROLS			
Front	Brightness	Power, Bright. Contrast Volume (7BM9.. only )	Power, Bright, Contrast, Hor. Phase, Vert. Center,
Rear	Green/Amber Hor. Width Vert. Size	Vert. Hold Vert. Size Hor. Phase Hor. Width	Normal/Text, Green Amber Hor. Width Vert. Size
Side	Power		
DIMENSIONS/WEIGHT			
Width (mm)	320	330	356
Height (mm)	330	303	325
Depth (mm)	335	310	407
Weight (kg)		7	11

	PHILIPS MONOCHROME 7BM749 / 7BM949 (VGA)	PHILIPS COLOUR 9CM082/3CM9809 /3CM9609 (VGA)	PHILIPS COLOUR 8CM852 (CGA)	PHILIPS COLOUR 8CM875 (VGA)
PICTURE TUBE				
Size	14" (7BM749) 12" (7BM949)	14"	14"	14"
Phosphor	WD, White			
EHT (KV)	12.3-13.3 (7BM949) 13.5-14.5 (7BM749)	24	25	24
RESOLUTION	hor.: 720 pixels vert.: 480 lines	640 × 350 (70Hz) 640 × 400 (70Hz) 640 × 480 (60Hz)	640 × 200	640 × 200 640 × 350 640 × 400 640 × 480 800 × 600 720 × 348
CHARACTER MATRIX				
DISPLAY FORMAT				
VIDEO BANDWIDTH	≥ 28 MHz	18 MHz	≥ 12 MHz	30 MHz
HOR. SCAN FREQ.	31.470 KHz	31.480 KHz	15.6 KHz	15.5 - 35 KHz
VERT. SCAN FREQ.	60/70 Hz	60/70 Hz	50/60 Hz	50/70 Hz
CONNECTIONS	RGB Linear	RGB Linear	SCARD (Linear) TTL / IRGB	TTL/Analogue
POWER SUPPLY				
Voltages	220-240V	190-264V	230 V ± 15%	120/240 V ± 15%
Consumption	30 W	85 W	75 W	85 W (at 240V)
USER CONTROLS				
Front	Power on/off Contrast Brightness	Power on/off Contrast Vertical center Horizontal phase	Power on/off Contrast Brightness Horizontal center	Power on/off Contrast Brightness Horizontal phase
Rear		Brightness Horizontal width Vertical height	Horizontal width Vertical height Vertical center	Vertical size Horizontal width Vertical height Vertical center TTL/Analogue Manual/Auto Text
DIMENSIONS/WEIGHT				
Width (mm)	330	356	350	362
Height (mm)	303	325	320	355
Depth (mm)	310	407	380	386
Weight (kg)	7	10.5	11	13

	PHILIPS AUTOSCAN COLOUR 4CM4270	PHILIPS AUTOSCAN COLOUR 4CM4280
PICT.TUBE		
Size	14"	14"
Phosphor		
EHT (KV)	25	25
RESOLUTION	HOR (kHz) VER(Hz) DOT *LINES MODE 31.5 70 640*350 VGA 31.5 70 640*400 VGA 31.5 60 640*480 VGA 37.8 72 640*480 S-VGA 35.0 67 640*480 MAC-II 35.2 56 800*600 S-VGA 37.8 60 800*600 S-VGA 48.1 72 800*600 S-VGA 49.8 75 832*600 APPLE 35.5 87 1024*768 I 8514A 48.4 60 1024*768 8514A 56.5 70 1024*768 8514A	HOR (kHz) VER(Hz) DOT *LINES MODE 31.5 70 640*350 VGA 31.5 70 640*400 VGA 31.5 60 640*480 VGA 37.8 72 640*480 S-VGA 35.0 67 640*480 MAC-II 35.2 56 800*600 S-VGA 37.8 60 800*600 S-VGA 48.1 72 800*600 S-VGA 49.7 75 832*624 Quadra 35.5 87 1024*768 I 8514A 48.4 60 1024*768 VESA 56.5 70 1024*768 VESA
CHAR. MATRIX		
DISPLAY FORMAT		
VIDEO BANDWIDTH	75 MHz	75 MHz
HOR. SCAN FREQ.	30 to 58 KHz	30 to 58 KHz
VERT. SCAN FREQ.	50 - 100 Hz	50 - 100 Hz
CONNECT	TTL	TTL
POWER SUPPLY		
Voltages	195 - 264 V	195 - 264 V
Consumption	85W (nom) 100W (max)	85W (nom) 100W (max)
USER CONTROLS		
Front	Power on / off Volume V - shift, V- size H - shift, H- size Contrast	Power on / off Volume V - shift, V- size H - shift, H- size Contrast
Rear		
DIMENSIONS		
Width (mm)	356 mm	356 mm
Height (mm)	353 mm	353 mm
Depth (mm)	395 mm	395 mm
Weight (kg)	12 kG	12 kG

	<b>PHILIPS</b> <b>AUTOSCAN COLOUR</b> <b>4CM6089 / 6099</b>			
PICT. TUBE				
Size	17"			
Phosphor				
EHT (KV)	25			
RESOLUTION	HOR (kHz)	VER(Hz)	DOT 1 LINES	MODE
	31.5	70	640*350	VGA
	31.5	70	640*400	VGA
	31.5	60	640*480	VGA
	37.8	72	640*480	S-VGA
	35.0	67	640*480	MAC-II
VESA	35.2	56	800*600	S-VGA
VESA	37.8	60	800*600	S-VGA
VESA1	48.1	72	800*600	S-VGA
	35.5	87	1024*768	8514A
	48.4	60	1024*768	VESA2
	56.5	70	1024*768	VESA3
SYNC ON GREEN	61.9	58.6	1280*1024	
CHAR. MATRIX				
DISPLAY FORMAT				
VIDEO BANDWIDTH	110 MHz			
HOR. SCAN FREQ.	30 to 66 KHz			
VERT. SCAN FREQ.	50 - 100 Hz			
CONNECT	TTL			
POWER SUPPLY				
Voltages	90 - 270 V			
Consumption	110W (nom) 120W (max)			
USER CONTROLS				
Front	Power on / off Contrast Contrast			
Rear				
DIMENSIONS				
Width (mm)	498 mm			
Height (mm)	427 mm			
Depth (mm)	536 mm			
Weight (kg)	23 kg			



	<b>PHILIPS</b> <b>VGA COLOUR</b> <b>6CM3209 6CM3279</b> <b>6CM3279 has lower radiation</b>	<b>PHILIPS</b> <b>VGA COLOUR</b> <b>7CM3209 7CM3279</b> <b>7CM3279 has lower radiation</b>
PICTURE TUBE		
Size	14"	14"
Phosphor		
EHT (KV)	25	25
RESOLUTION	HOR (kHz) VER(Hz) DOT *LINES	HOR (kHz) VER(Hz) DOT *LINES
EGA	31.5 70 640*350	31.5 70 640*350
VGA	31.5 70 640*400	31.5 70 640*400
VGA	31.5 60 640*480	31.5 60 640*480
S- VGA (VESA)	37.8 60 800*600	37.8 60 800*600
S- VGA (VESA)		35.2 56 800*600
8514A		35.5 87 1024*768 INT
CHARACTER MATRIX		
DISPLAY FORMAT		
VIDEO BANDWIDTH	32 MHz	32 MHz
HOR. SCAN FREQ.	31.5 / 37.8 KHz	31.5 / 35.2 / 37.8 KHz
VERT. SCAN FREQ.	50 - 87 Hz	50 - 87 Hz
CONNECTIONS	TTL	TTL
POWER SUPPLY		
Voltages	220 - 240 V	220 - 240 V
Consumption	80W (typ)	80W (typ)
USER CONTROLS *		
Front		Power on / off V - shift H - shift Bright Contrast
Right side	Power on / off	
Left side	V - shift H - shift Bright Contrast	
DIMENSIONS/WEIGHT		
Width (mm)	356 mm	356 mm
Height (mm)	359 mm	359 mm
Depth (mm)	395 mm	395 mm
Weight (kg)	14 kg	14 kg

\* Note: The operator controls shown are for the 6CM32XX-00T/20T.  
The 6CM32XX-60T has 6 operator controls and on/off switch at the front.

For the 7CM32XX-50T the operator controls are shown in the table above.  
The 7CM32XX-00T/ 20T has 4 operator controls at the left side and the power on/off switch at the right side.

The 7CM32XX-60T has 6 operator controls and on/off switch at the front.



	<b>PHILIPS</b> <b>VGA COLOUR</b> <b>7CM3689</b>		
PICTURE TUBE			
Size	14"		
Phosphor			
EHT (KV)	24.5		
RESOLUTION	HOR (kHz)	VER(Hz)	DOT *LINES
VGA	31.5	70	640*350
VGA	31.5	70	640*400
VGA	31.5	60	640*480
S- VGA (VESA)	35.2	56	800*600
8514A	35.5	87	1024*768 INT.
CHARACTER MATRIX			
DISPLAY FORMAT			
VIDEO BANDWITH	45 MHz		
HOR. SCAN FREQ.	31.7 / 35.2 / 35.5 KHz		
VERT. SCAN FREQ.	50 - 90 Hz		
CONNECTIONS	TTL		
POWER SUPPLY			
Voltages	90 - 264 V		
Consumption	80W (typ) 100W (max)		
USER CONTROLS			
Front	Power on / off V - shift H - shift V - size H - size Bright Contrast		
Rear			
DIMENSIONS/WEIGHT			
Width (mm)	356 mm		
Height (mm)	359 mm		
Depth (mm)	395 mm		
Weight (kg)	12.8 kg		

	PHILIPS VGA COLOUR 8CM3279	PHILIPS VGA COLOUR 8CM3289
PICTURE TUBE		
Size	14"	14"
Phosphor		
EHT (KV)	24	24.5
RESOLUTION	HOR (kHz) VER(Hz) DOT *LINES	HOR (kHz) VER(Hz) DOT *LINES
VGA	31.5 70 640*350	31.5 70 640*350
VGA	31.5 70 640*400	31.5 70 640*400
VGA	31.5 60 640*480	31.5 60 640*480
S - VGA (VESA1)	48.1 72 800*600	48.1 72 800*600
E - VGA (VESA2)	48.4 60 1024*768	48.4 60 1024*768
CHARACTER MATRIX		
DISPLAY FORMAT		
VIDEO BANDWITH	65 MHz	45 MHz
HOR. SCAN FREQ.	31.5 / 48.1 / 48.4	31.5 / 48.1 / 48.4
VERT. SCAN FREQ.	50 - 90 Hz	50 - 90 Hz
CONNECTIONS	TTL	TTL
POWER SUPPLY		
Voltages	195 - 264 V	90 - 264 V
Consumption	80W (typ) 100W (max)	80W (typ) 100W (max)
USER CONTROLS		
Front	Power on / off V - shift H - shift V - size H - size Bright Contrast	Power on / off V - shift H - shift V - size H - size Bright Contrast
Rear		
DIMENSIONS/WEIGHT		
Width (mm)	356 mm	356 mm
Height (mm)	359 mm	359 mm
Depth (mm)	395 mm	395 mm
Weight (kg)	12.8 kg	12.8 kg

## **21.2. PHILIPS MONOCHROME 325 (P2723-30x)**

### **21.2.1. Characteristics Philips Monochrome 325**

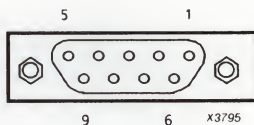
The Philips Monochrome 325 (M12/325) is a 325 line monochrome monitor. There are two versions of the monitor. The only difference between them is the AC supply voltage.

P2723-301	110 VAC 60 Hz North America
P2723-302	220 VAC 50 Hz Europe

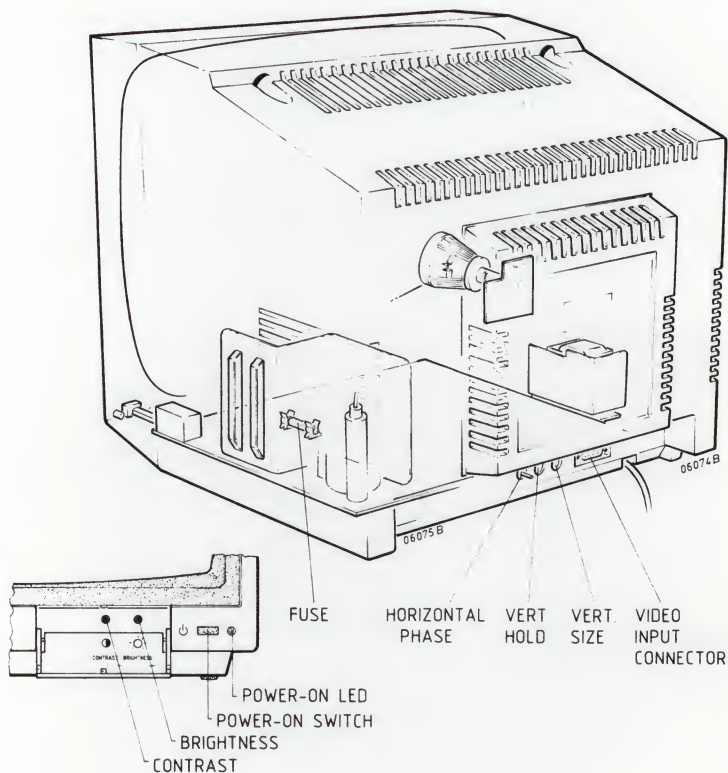
## 21.2.2. Connections Philips Monochrome 325

### Video Connector

PIN	SIGNAL NAME
1	GROUND
2	GROUND
3	N.C.
4	N.C.
5	N.C.
6	INTENSITY
7	VIDEO
8	HORIZONTAL SYNC
9	VERTICAL SYNC-N



### Locator



#### 21.2.4. Modification History Philips Monochrome 325

SI-NR	SUBJECT
P3100-028	New Philips monitor P2723-302

#### 21.2.5. Installation/Maintenance Philips Monochrome 325

The monitor power cable should be connected at the rear of the PC. The monitor may only be connected to a video controller which operates in monochrome mode. When initially installing the monitor, adjust the display for optimum clarity.





## **21.3. AMDEK / SAMPO MONITOR**

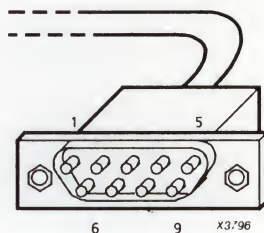
### **21.3.1. Characteristics Amdek / Sampo Monitor**

The Amdek / Sampo Monitor is a 12 inch monochrome monitor for TTL level input signals.

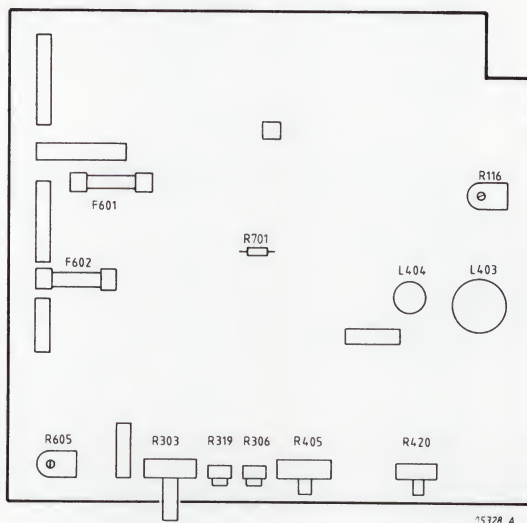
## 21.3.2. Connections Amdek / Sampo Monitor

### Video Connector

PIN	SIGNAL NAME
1	GROUND
2	GROUND
3	RESERVED
4	RESERVED
5	RESERVED
6	INTENSITY
7	VIDEO
8	HORIZONTAL SYNC
9	VERTICAL SYNC



## 21.3.3. Strap Settings / Adjustments Amdek / Sampo Monitor



R303 = VERTICAL HOLD  
 R405 = HORIZONTAL HOLD  
 R306 = VERTICAL SIZE  
 R319 = VERTICAL LIN  
 R116 = SUB-BRIGHTNESS  
 R420 = FOCUS  
 R605 = B+ POWER ADJUSTMENT

L403 = HORIZONTAL SIZE  
 L404 = HORIZONTAL LIN  
 F601 = T - 800mA 250V  
 F602 = T - 315A 250V

### 21.3.4. Modification History Amdek / Sampo Monitor

SI-NR	SUBJECT
P3100-026	Switch on problems Amdek / Sampo Monitor

On some systems the monitor does not give a picture on the screen when it is switched on before the system unit. This can be solved by changing the R701 resistor (see section 21.3.3.) on the main board of the monitor from 33K to 27K if this happens regularly. A correct power-on sequence solves this problem also.

### 21.3.5. Installation/Maintenance Amdek / Sampo Monitor

The monitor may only be connected to a video controller which operates in monochrome mode.





## 21.4. TATUNG COLOUR (P2725-100)

CM-1322 P CGA

### 21.4.1. Characteristics Tatung Colour

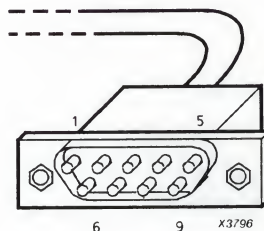
The Tatung CM-1322P is a 13" IRGB colour monitor, for use with the PC in conjunction with an IBM compatible colour board. This monitor can display 16 colours, ( 8 colours with 2 levels of intensity ), and has sufficient video bandwidth for a 640x200 graphics display, ( non- interlaced or 640x400 interlaced ).

The mains input voltage selection is done automatically by the monitor.

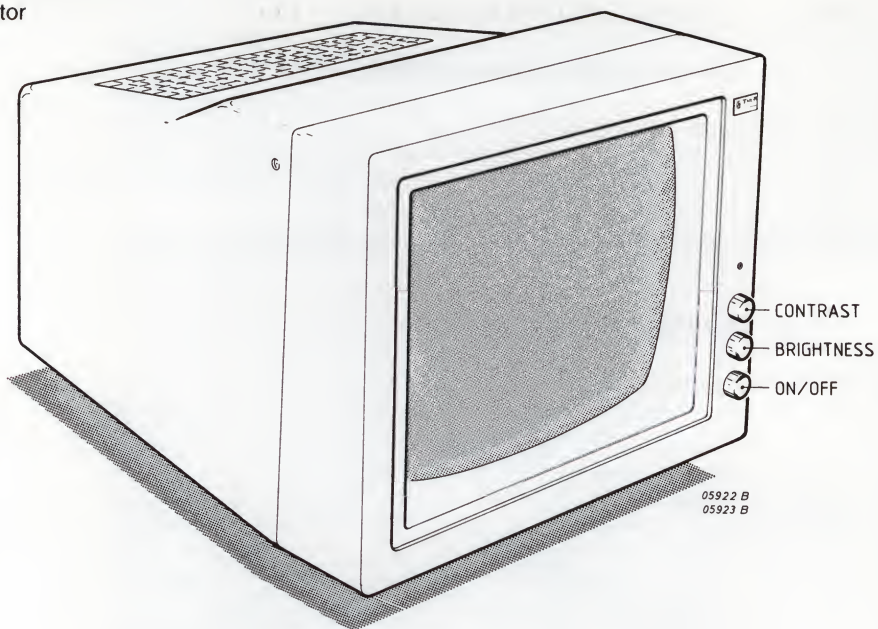
### 21.4.2. Connections Tatung Colour

IRGB Video Connector

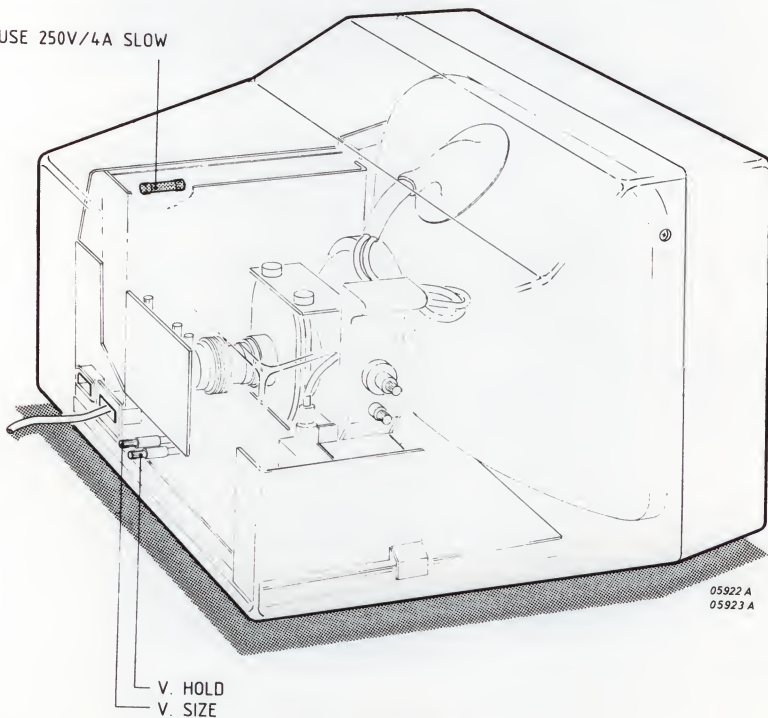
PIN	SIGNAL NAME
1	GROUND
2	GROUND
3	RED VIDEO
4	GREEN VIDEO
5	BLUE VIDEO
6	INTENSITY
7	RESERVED
8	HORIZONTAL SYNC
9	VERTICAL SYNC



# Locator



FUSE 250V/4A SLOW



#### **21.4.5. Installation/Maintenance Tatung Colour**

The monitor should be connected to a suitable colour board, with the power to both the system unit and monitor off. The monitor may only be connected to a video controller which operates in colour mode.



## **21.5. PHILIPS MONOCHROME 400 (P2724-30x)**

### **21.5.1. Characteristics Philips Monochrome 400**

The Philips Monochrome Monitor M12/400 is a 400 line monochrome monitor. There are two versions of the monitor, the only difference between them is the AC supply voltage.

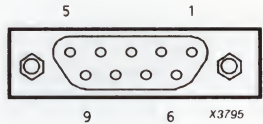
P2724-301	M12/400-75/74	115 VAC 60 Hz North America
P2724-302	M12/400-75/00	230 VAC 50 Hz Europe



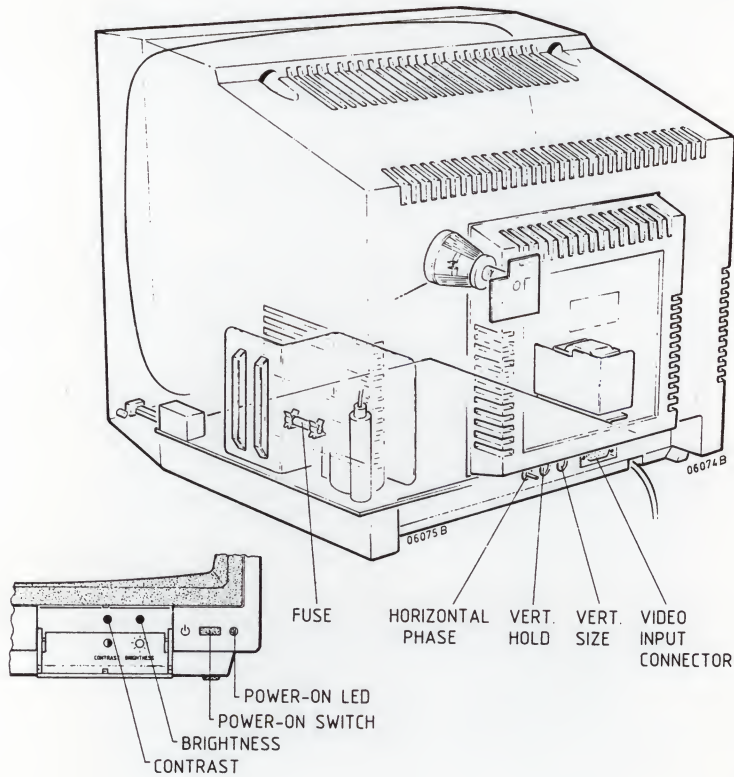
21.5.2. Connections Philips Monochrome 400

Video Connector

PIN	SIGNAL NAME
1	GROUND
2	GROUND
3	N.C.
4	N.C.
5	N.C.
6	INTENSITY
7	VIDEO
8	HORIZONTAL SYNC
9	VERTICAL SYNC-N



Locator



### **21.5.5. Installation/Maintenance Philips Monochrome 400**

The monitor power cable should be connected to the IEC outlet on the rear of the PC. The video cable is not polarised, and may be connected either way round. This monitor may only be connected to the monochrome video output, never to a colour board. When initially installing the monitor, adjust the display for optimum clarity.



## **21.6. PHILIPS MONOCHROME 350 (P2722-xxx) (7BM5x3)**

### **21.6.1. Characteristics Philips Monochrome 350**

The Philips Monochrome Monitor is a 12 inch 350 line monochrome monitor. There are different versions of the monitor, the main difference between them is the AC supply voltage. The 7BM5x3 has a tilt-swivel stand as standard.

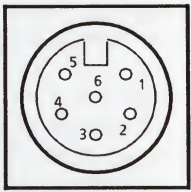
P2722-601 (BM75xx)	120 VAC 60 Hz Amber
P2722-301 (BM75xx)	110 VAC 60 Hz Amber
P2722-302 (BM7523)	220 VAC 50 Hz Amber
P2722-303 (BM75xx)	240 VAC 50 Hz Amber

7BM5x3	110 VAC 60 Hz Amber
7BM5x3	220 VAC 50 Hz Amber
7BM5x3	240 VAC 50 Hz Amber

21.6.2. Connections Philips Monochrome 350

Video Connector

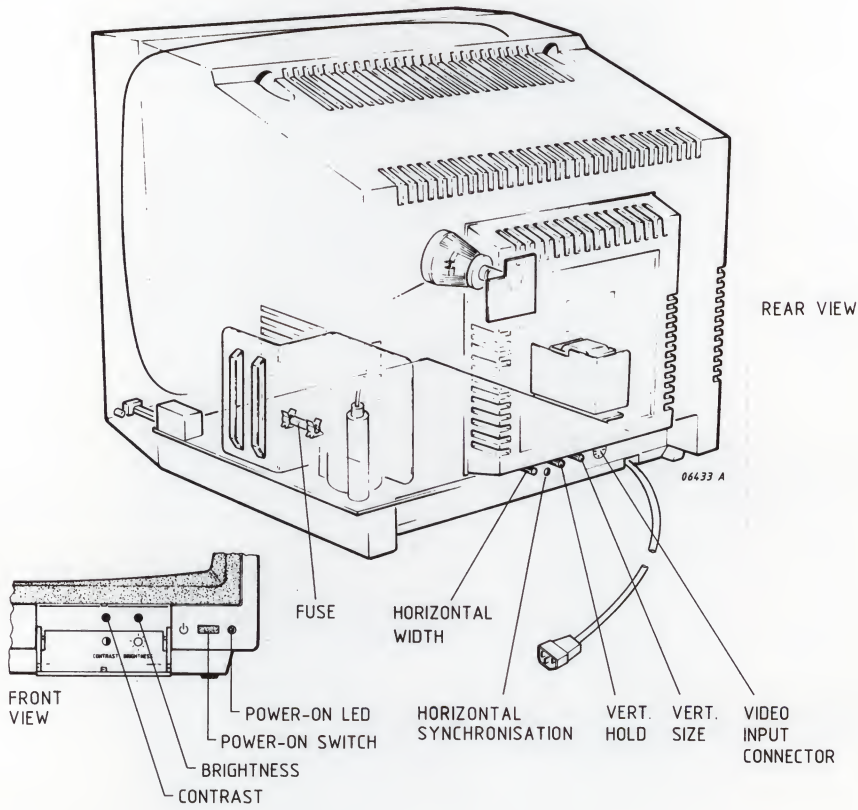
PIN	SIGNAL NAME
1	HORIZONTAL SYNC
2	VERTICAL SYNC-N
3	GROUND
4	INTENSITY
5	VIDEO
6	SHIELD



X3051

EXTERNAL VIEW OF MONITOR CONNECTOR

Locator





### **21.6.5. Installation/Maintenance Philips Monochrome 350**

The monitor power cable should be connected to the IEC outlet on the rear of the system. This monitor may only be connected to a video controller which operates in monochrome mode.



## **21.7. SAMPO ENHANCED COLOUR MONITOR (P2728-200)**

### **21.7.1. Characteristics Sampo Enhanced Colour Monitor**

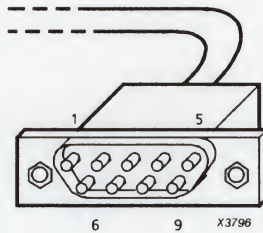
The P2728-200 (SAMPO KDS-1322) is a colour monitor with an extra high resolution (EGA). For this reason this monitor is especially suitable for graphics purposes.

The KDS-1322 can be used in combination with a CGA / EGA video controller.

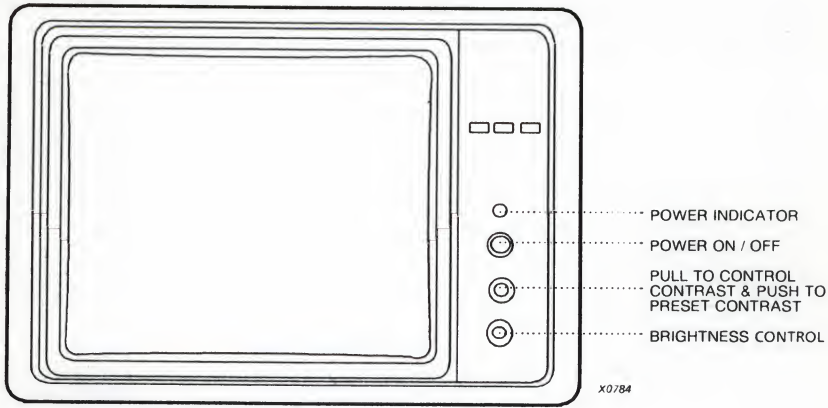
This monitor is suitable for two line scanning frequencies, dependent on the polarity of the vertical synchronization pulse. The display can work in CGA and EGA mode.

21.7.2. Connections Sampo Enhanced Colour Monitor

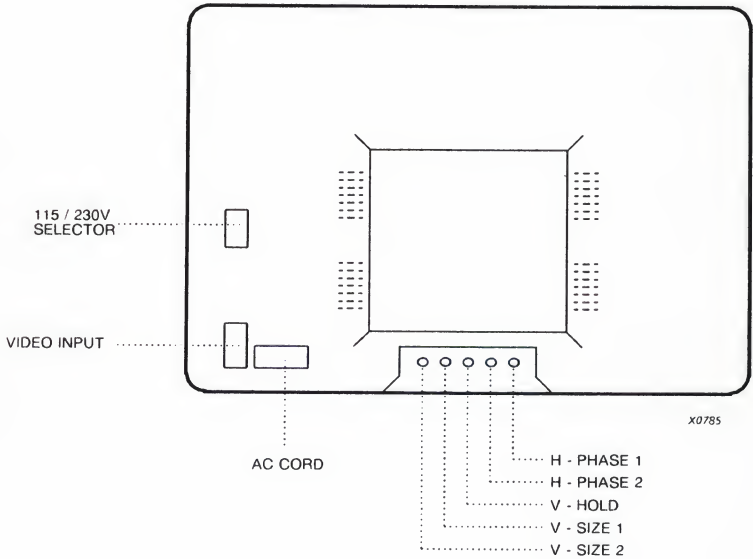
PIN	SIGNAL NAME (CGA)	SIGNAL NAME (EGA)
1	GROUND	GROUND
2	N.C.	R" (SECONDARY RED)
3	R (PRIMARY RED)	R (PRIMARY RED)
4	G (PRIMARY GREEN)	G (PRIMARY GREEN)
5	B (PRIMARY BLUE)	B (PRIMARY BLUE)
6	INTENSITY	G" (SECONDARY GREEN)
7	N.C.	B" (SECONDARY BLUE)
8	HORIZONTAL SYNC	HORIZONTAL SYNC
9	VERTICAL SYNC (-N SELECTABLE)	VERTICAL SYNC (-N SELECTABLE)



Locator



Front View



Rear View



### **21.7.5. Installation / Maintenance Sampo Enhanced Colour Monitor**

The monitor should be connected to a suitable colour board, with the power to both the system unit and monitor off. This monitor may only be connected to a video controller which operates in colour mode.

## 21.8. TERMINAL P2706

### 21.8.1. Characteristics Terminal P2706-0xx

The Terminal P2706 consists of a display console and a detachable keyboard. The terminal contains one PCB, called the Terminal PCB.

Two V24 interfaces are present, one is used for connection to the system (*MODEM*), the other (*AUX*) could be used for connection of peripherals (e.g. printer). Use of the AUX interface is not supported.

P2706-001      14" Alphanumeric 110V green

P2706-012      14" Alphanumeric 220V amber

### 21.8.2. Connections Terminal P2706

#### Keyboard Connector

PIN	SIGNAL NAME
1	DATA
2	+ 5V
3	CLOCK
4	GROUND

#### MODEM Connector

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SHIELD	14	
2	TXD (O)	15	
3	RXD (I)	16	
4	RTS (O)	17	
5	CTS (I)	18	
6		19	
7	GROUND	20	DTR (O)
8	DCD (I)	21	
9		22	
10		23	
11		24	
12		25	
13			

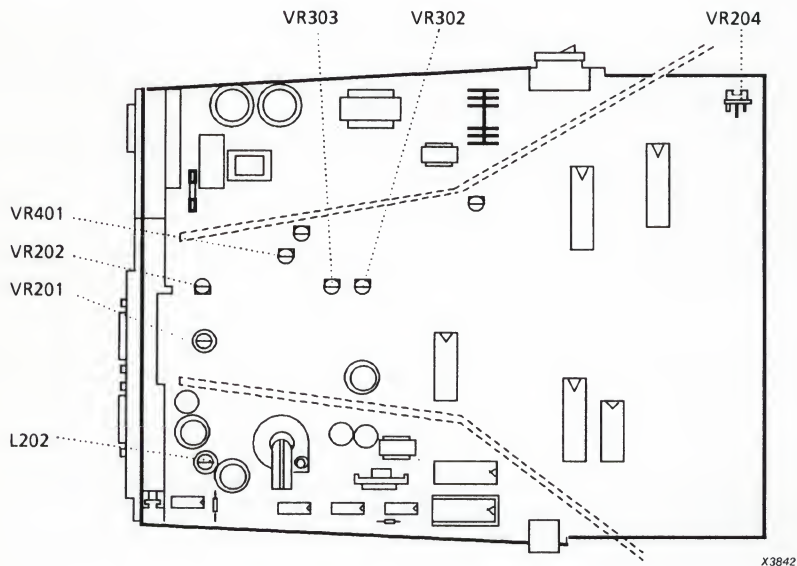
#### AUX Connector

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SHIELD	14	
2	TXD (I)	15	
3	RXD (O)	16	
4		17	
5		18	
6	DSR (O)	19	
7	GROUND	20	DTR (I)
8		21	
9		22	
10		23	
11		24	
12		25	
13			

### 21.8.3. Strapsettings / Adjustment Terminal P2706

Adjustment procedure

Warning: Do not use metallic tools for adjustment.



COMPONENT	FUNCTION
VR201	focus
VR202	sub-brightness
VR204	contrast
VR302	height
VR303	linearity
VR401	brightness
L202	width

- Switch on the monitor and allow a three minutes warm-up period (for very precise adjustment this warm-up period should be 30 minutes).
- If needed the screen can be filled with a test pattern. This is done in the following way:
  - Enter the set-up menu (Cntrl-Shift ESC), and select the Miscellaneous Menu (F6). Select TEST=ON. Leave the menu by pressing F10 and select SAVE MODE (Top of screen). Now press F10 again to leave the setup menu.
  - Switch the terminal off and on again. When the screen shows the flashing testpattern, press the space-bar until the test pattern appears on the screen. Different test patterns can be selected by pressing the keys 'Ctrl' and 'A' simultaneously until the next pattern appears.
  - The testmode can be left when one of the test patterns is selected by holding down the '-' key on the numeric keypad.
- **Height**  
Adjust VR302 until the top edge and the bottom edge of the display are both 11 mm.  $\pm 2$  mm. from the edge of the bezel.
- **Width**  
Adjust L202 until either side of the display is 11 mm.  $\pm 2$  mm. from the edge of the bezel.
- **Brightness**  
Three degrees of brightness can be adjusted, use the testpattern containing the three blocks showing this. Follow these steps:
  - Slide the brightness slideswitch at the front of the terminal as far to the right as possible.
  - Turn VR202 as far clockwise as possible. You will see the raster lines on the screen.
  - Slowly turn VR202 just until the raster is not visible.
  - Look at the outside brightness blocks. If either the left is to bright or the right block is to dark, adjust VR401 until it is corrected.
  - Slide the external brightness slideswitch as far left as possible.
  - Adjust VR204 just until the normal block on the right of the screen is no longer visible.
- **Focus**  
Adjust VR201 until the the characters halfway between the center of the display and the bezel are distinct and clear.
- **Linearity**  
Adjust VR303 until characters on the bottom of the display are the same height as those on the top.



### 21.8.5. Installation/Maintenance Terminal P2706

Connect the MODEM interface of the terminal to the AST splitter cable using the serial terminal cable.

#### Removal of terminal PCB

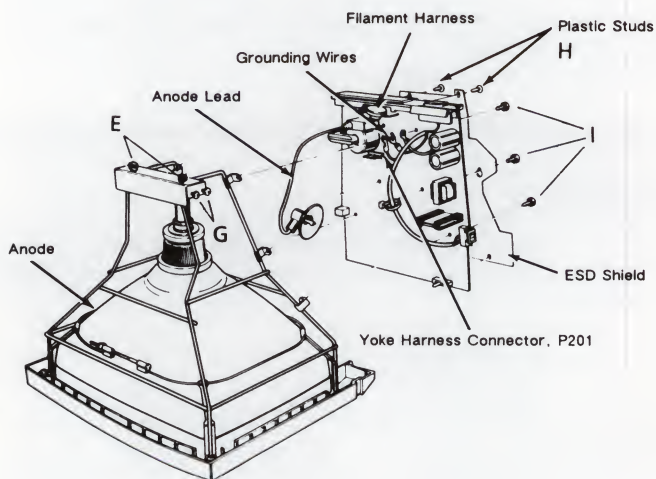
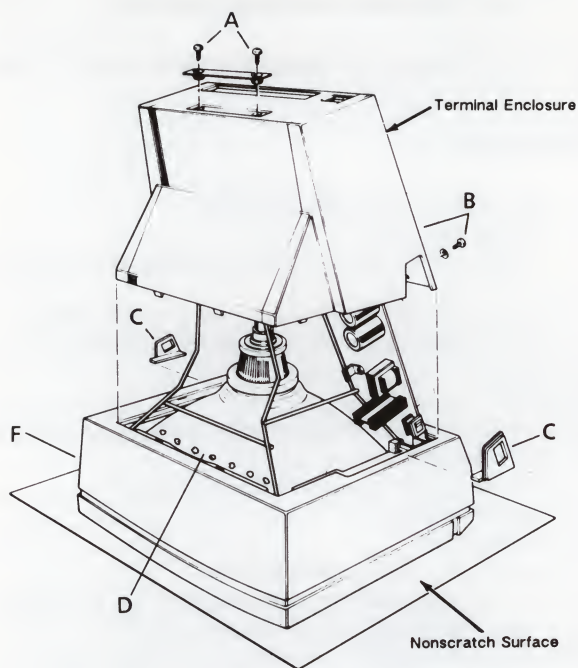
Follow the next steps to remove the terminal PCB.

- Remove the terminal enclosure.
  - remove all cables from the rear of the terminal and disconnect the keyboard cable.
  - rest the display face of the terminal on a non-scratch surface.
  - remove the two Phillips screws (A) from the rear and the two plastic screws (B) from the bottom.
  - lift off the terminal enclosure.
  - remove the plates (C) around power switch and keyboard connector.
- Remove the metal shielding. (not in figures)
  - remove the seven screws (D) and the two screws (E).
  - lift off the metal shielding.
- Remove the terminal PCB.
  - pull the back bezel (F) off the terminal frame.
  - discharge the anode (see below) and disconnect the anode lead.
  - disconnect the connector P201 from the terminal PCB.
  - carefully remove the tube socket from the neck of the CRT.
  - unscrew the two Phillips screws (G) that secure the grounding wires to the CRT wire frame
  - remove the two plastic studs (H) that secure the ESD shield to the back of the terminal PCB.
  - remove the six screws (I) that hold the ESD shield in place.
  - remove the ESD shield.
  - lift the terminal PCB up and out.

To install the terminal PCB, these steps should be followed in the reversed order.

#### Discharging the Anode.

Use an insulated screw-driver to discharge the anode. Ground the shaft of the screw driver to the wire frame of the terminal. Now slip the blade between the anode cap and the anode and touch the anode. Listen for a popping or crackling sound. The anode is then discharged.



The following settings in the set-up screen should be used when the terminal is connected to the P3400.

The set-up screen can be entered by pressing the keys 'Ctrl'-'Shift'-'Esc' simultaneously.

F1- Keyboard	National mode:	ON
	Nat. Version:	should match keyboard connected
F2-Display	Nat. version:	should match setting for keyboard
	Emulation:	VT220-7
F5-Communications	Line Speed:	9600
	Data/stop bits:	8'1
	Parity:	OFF
	Line control:	xon.xoff
F6-Miscellaneous	Enhanced:	OFF

Use the "SAVE ALL" option before leaving the set-up screens to save the changes.

## 21.8.6. Diagnostic Functions P2706

When the terminal is switched on it executes an internal self-check. It tests the terminals memory and external communication ports. If the test detects an error, an error message (consisting of a single character) appears on the display. If any of these messages appear, replace the terminal PCB.

The terminal can run an extended internal test. The test is started in the setup menu. This test requires a set of test connectors. Two different sets of connectors can be used. The program will produce different error codes depending on the set of connectors used. Follow these steps to execute the test:

- Turn the terminal off and disconnect any communication cables on the back of the terminal.
- Attach the test connectors to the MODEM and AUX ports on the rear of the terminal.
- Turn the terminal on.
- Enter the set-up menu (Cntrl-Shift ESC), and select the Miscellaneous Menu (F6). Select *TEST = ON*. Leave the menu by pressing *F10* and select *SAVE MODE* (Top of screen). Now press *F10* again to leave the setup menu.
- Switch the terminal off and on again. The extended test is now performed and showing a flashing testpattern.

If the test fails, the terminal beeps and a letter or number appears on the screen. In this case replace the terminal PCB.

**Note:** *To fully test the terminal, let the diagnostic self-test run 5 minutes.  
To end the self test press the spacebar until one of the testpatterns appear,  
then press the "-" key on the numeric keypad until the test terminates.*

Testconnectors: use male 25 pin D-connectors and connect the following pins :

SET1:	MODEM port	AUX port
	2 - 3	2 - 3
	4 - 5	6 - 20
	20 - 8	
SET2:	MODEM and AUX ports	
	MODEM 2 - AUX 2	
	MODEM 3 - AUX 3	

## **21.9. PHILIPS FSQ MONOCHROME 350 (BM77x3 / BM79x3) (7BM7x3 / 7BM9x3)**

### **21.9.1. Philips Characteristics FSQ Monochrome 350**

The Philips Flat Square Screen Monitor is a 12 inch (BM77x3 / 7BM7x3) or 14 inch (BM79x3 / 7BM9x3) 350 line monochrome monitor. There are different versions of the monitor. The main difference between them is the AC supply voltage. The 7BM7x3 / 7BM9x3 has a tilt-swivelstand as standard.

BM77x3-00G/BM79x3-00G 220 VAC 50 Hz

BM77x3-05G/BM79x3-05G 240 VAC 50 Hz

BM77x3-74G/BM79x3-74G 120 VAC 60 Hz

7BM7x3-00G/7BM9x3-00G 220 VAC 50 Hz

7BM7x3-05G/7BM9x3-05G 240 VAC 50 Hz

7BM7x3-74G/7BM9x3-74G 120 VAC 60 Hz

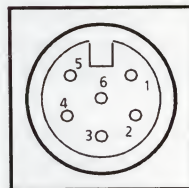


## 21.9.2. Connections Philips FSQ Monochrome 350

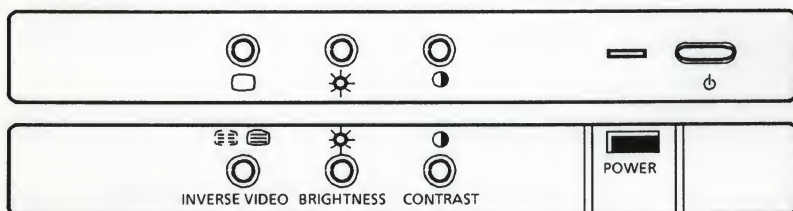
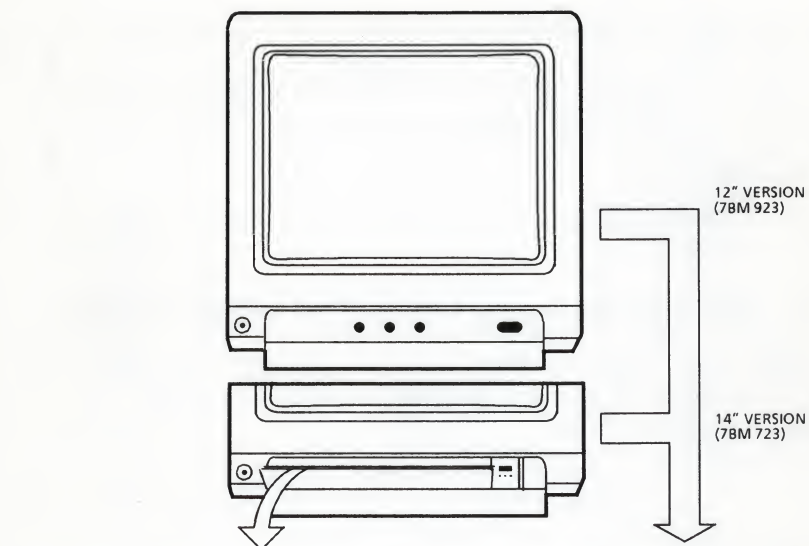
### Video Connector

PIN	SIGNAL NAME
1	HORIZONTAL SYNC
2	VERTICAL SYNC-N
3	GROUND
4	INTENSITY
5	VIDEO
6	SHIELD

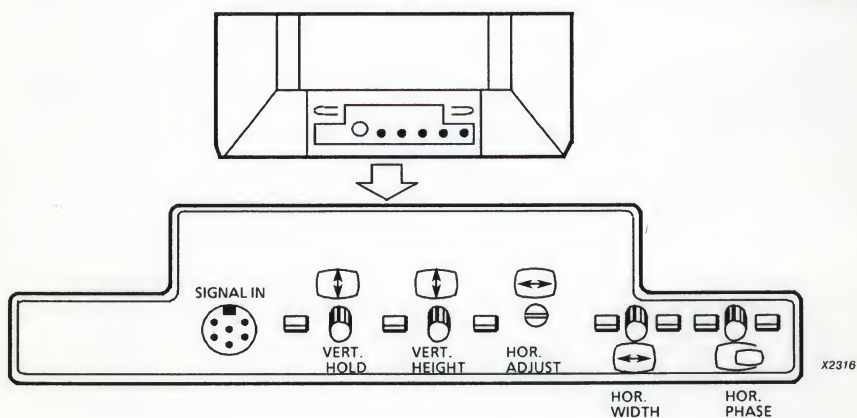
x 305%



EXTERNAL VIEW OF  
MONITOR CONNECTOR



X3072



X2316

#### 21.9.4. Modification History Philips FSQ Monochrome 350

12NC	SUBJECT
8603 107 23xxx 8603 109 13xxx 8603 109 23xxx 8603 117 130xx 8603 117 230xx	Transistor TS102 badly mounted. This problem was solved in production starting January 1989.

#### 21.9.5. Installation/Maintenance Philips FSQ Monochrome 350

The monitor power cable should be connected to the IEC outlet on the rear of the system. The monitor video cable must be connected to a video controller which operates in monochrome mode.

## **21.10. PHILIPS FSQ COLOUR MONITOR (CM9053 / CM9073) (9CM053 / 9CM073)**

### **21.10.1. Characteristics Philips FSQ Colour Monitor**

The 9CM053 / 9CM073 is a colour monitor with an extra high resolution (EGA). For this reason this monitor is especially suitable for graphics purposes. The 9CM053 and 9CM073 are electrical identical, but the 9CM053 has a lower resolution (phosphor pixel distance 0.39 mm) than the 9CM073 (phosphor pixel distance 0.31 mm). This monitor can be used in combination with a CGA / EGA video controller. This monitor is suitable for two line scanning frequencies, dependent on the polarity of the vertical synchronization pulse. The display can work in CGA and EGA mode; however, because of the lower resolution of the 9CM053 this monitor is used in practice as a CGA monitor, while the 9CM073 is used as an EGA monitor. The 9CM073 / 9CM053 have a tilt-swivel stand as standard.

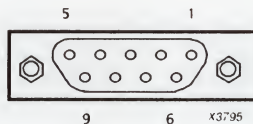
9CM073-00B (no FTZ)

9CM073-02B (incl FTZ)

## 21.10.2. Connections Philips FSQ Colour Monitor

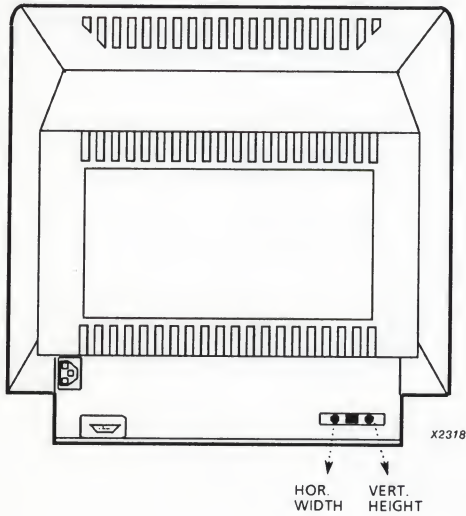
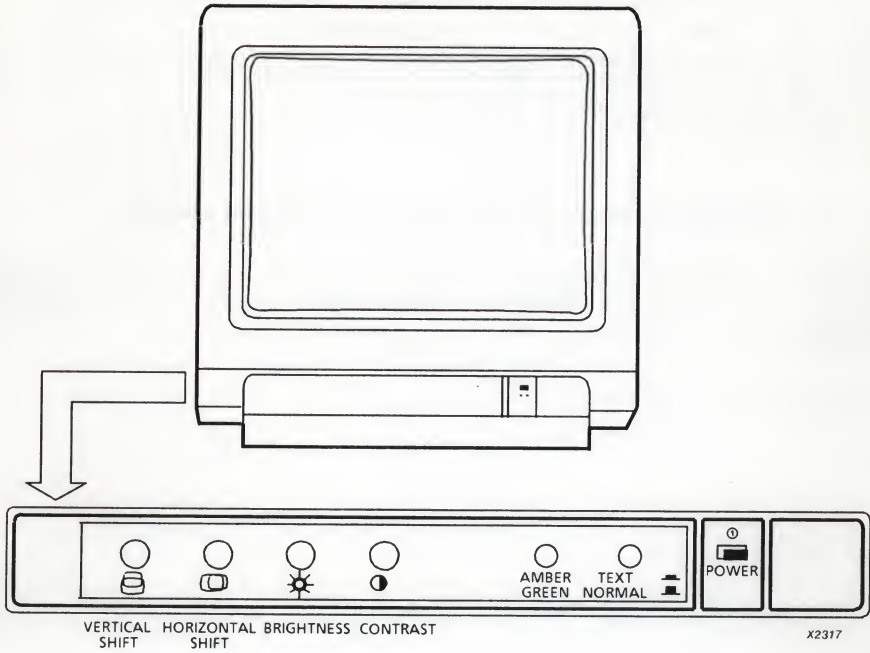
### Video Connector

PIN	SIGNAL NAME (CGA)	SIGNAL NAME (EGA)
1	GROUND	GROUND
2	N.C.	R" (SECONDARY RED)
3	R (PRIMARY RED)	R (PRIMARY RED)
4	G (PRIMARY GREEN)	G (PRIMARY GREEN)
5	B (PRIMARY BLUE)	B (PRIMARY BLUE)
6	INTENSITY	G" (SECONDARY GREEN)
7	N.C.	B" (SECONDARY BLUE)
8	HORIZONTAL SYNC	HORIZONTAL SYNC
9	VERTICAL SYNC (-N SELECTABLE)	VERTICAL SYNC (-N SELECTABLE)





Locator



#### 21.10.4. Modification History Philips FSQ Colour Monitor

12NC	SUBJECT
8604 310 xxxxx 8604 200 xxxxx	Problem of flickering due to flashes between the CRT and the ring of the multipole unit solved.

#### 21.10.5. Installation/Maintenance Philips FSQ Colour Monitor

The monitor should be connected to a suitable colour board, with the power to both the system unit and monitor off. This monitor may only be connected to a video controller which operates in colour mode.

EGA

CM 9043

0.42 mm

9053

0.39 mm

9073

0.31 mm

FSQ

21.10

3M705

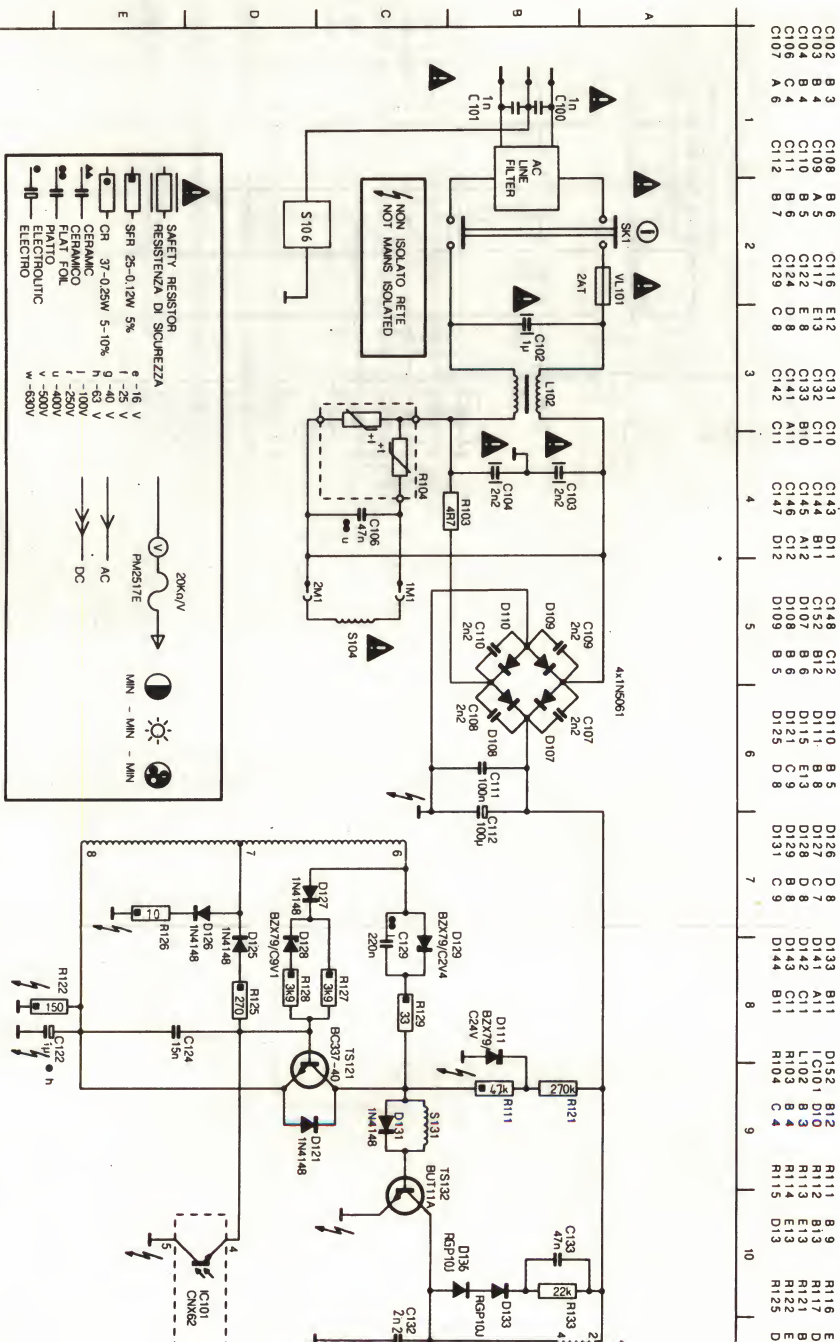
4M705

5M705

6M705

7M705

8M705



## **21.11. PHILIPS MONOCHROME MONITOR 7BM749/7BM949 (VGA)**

### **21.11.1. Characteristics Philips Monochrome Monitor 7BM749/7BM949**

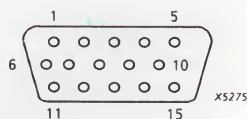
The main difference between the 7BM749 and the 7BM949 is the screen size. The 7BM749 has a screen size of 14", the 7BM949 has a screen size of 12". This monitor should be used with a VGA controller.



## 21.11.2. Connections Philips Monochrome Monitor 7BM749/7BM949

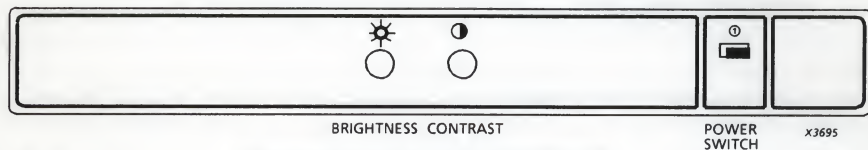
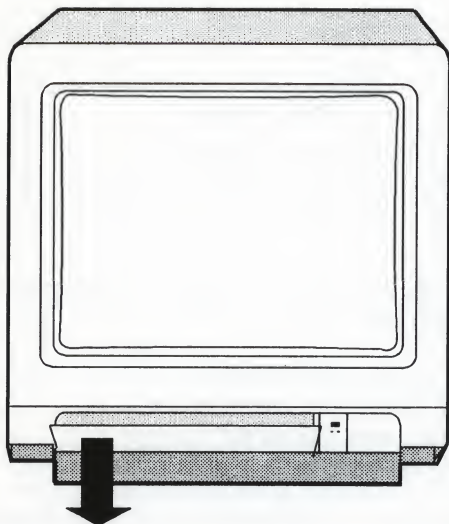
### Video Connector

PIN	SIGNAL NAME
1	N. C.
2	VIDEO
3	N. C.
4	N. C.
5	GROUND
6	N. C.
7	GROUND
8	N. C.
9	N. C.
10	GROUND
11	N. C.
12	GROUND
13	HORIZONTAL SYNC
14	VERTICAL SYNC
15	N. C.

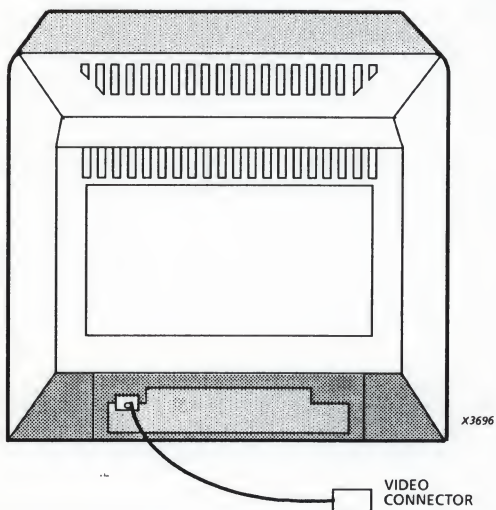


## Locator

Front View



Rear view



#### **21.11.4. Modification History Philips Monochrome Monitor 7BM749/7BM949**

The table below gives an overview of modifications made to the monitor.

DESCRIPTION
R709 replaced by Zener diode and value of R710 changed to overcome high failure rate of blanking circuit transistor Q703

#### **21.11.5. Installation / Maintenance Philips Monochrome Monitor 7BM749 / 7BM949**

The monitor power cable should be connected to the IEC outlet on the rear of the system. The monitor video cable must be connected to the video controller output (take care that the video controller switch settings are correct).

#### **21.11.6. Diagnostic Functions Philips Monochrome Monitor 7BM749/7BM949**

The monitor is provided with a self-test feature. When the video interface cable of the monitor is disconnected (but power is still provided), the monitor should display an equal white frame.

## 21.12. PHILIPS COLOUR MONITOR 9CM082/3CM9809/3CM9609 (VGA)

### 21.12.1. Characteristics Philips Colour Monitor 9CM082/3CM9809/3CM9609

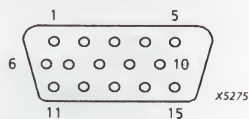
The 9CM082, 3CM9809 and 3CM9609 monitors are similar. The major difference in these monitors is that the 9CM082 has a dot pitch of 0.31 mm, the 3CM9809 has a dot pitch of 0.29 mm and the 3CM9609 has a dot pitch of 0.39 mm. These monitors are colour monitors that can be used in combination with a VGA video controller. They work with three different resolutions (depending on the polarity of the horizontal and vertical sync signal)

POLARITY		RESOLUTION	FREQUENCY
HOR. SYNC	VERT. SYNC		
POS	NEG	640 X 350	(70HZ)
NEG	POS	640 X 400	(70HZ)
NEG	NEG	640 X 480	(60HZ)

## 21.12.2. Connections Philips Colour Monitor 9CM082/3CM9809/3CM9609

### Video Connector

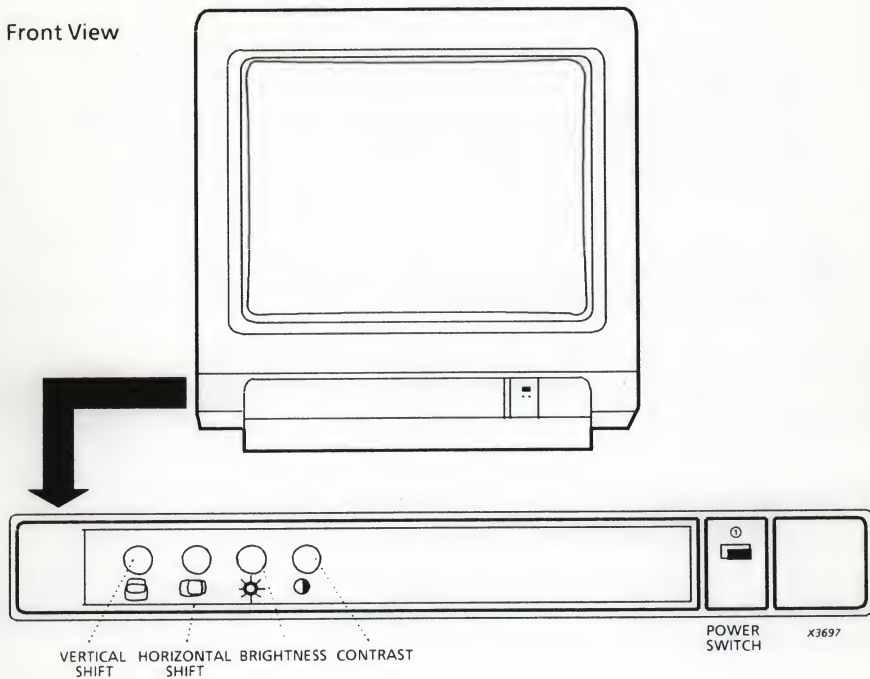
PIN	SIGNAL NAME
1	RED
2	GREEN
3	BLUE
4	N. C.
5	SELF TEST
6	RED GROUND
7	GREEN GROUND
8	BLUE GROUND
9	N. C.
10	GROUND
11	GROUND
12	N. C.
13	HORIZONTAL SYNC
14	VERTICAL SYNC
15	N. C.



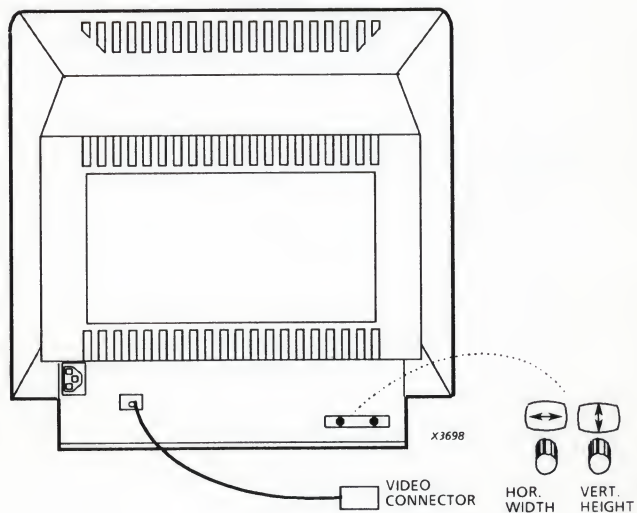


## Locator

Front View



Rear view



#### **21.12.4. Modification History Philips Colour Monitor 9CM082/3CM9809/3CM9609**

12NC	SUBJECT
8604 200 820xxx	Problem of flickering due to flashes between the CRT and the ring of the multipole unit solved.

#### **21.12.5. Installation/Maintenance Philips Colour Monitor 9CM082/3CM9809/3CM9609**

The monitor power cable should be connected to the IEC outlet on the rear of the system. The monitor video cable must be connected to the video controller output (take care that the video controller switch settings are correct).

#### **21.12.6. Diagnostic Functions Philips Colour Monitor 9CM082/3CM9809/3CM9609**

The monitor is provided with a self-test feature. When the video interface cable of the monitor is disconnected (but power is still being provided), the monitor should display an equal white frame.

## 21.13. PHILIPS COLOUR MONITOR 8CM852

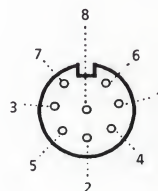
### 21.13.1. Characteristics Philips Colour Monitor

The Philips 8CM852 is a 14" IRGB colour monitor (CGA) which incorporates a TTL-IRGB interface as well as a SCART interface for connecting a VCR (Video Cassette Recorder). This monitor can display 16 colours (8 colours with two levels of intensity), and has sufficient video bandwidth for a 640x200 graphics display, (non-interlaced) or 640x400 (interlaced).

### 21.13.2. Connections Philips Colour Monitor

#### TTL/RGBI Connector

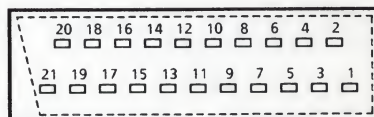
PIN	SIGNAL NAME
1	N.C.
2	RED VIDEO
3	GREEN VIDEO
4	BLUE VIDEO
5	INTENSITY
6	GROUND
7	HORIZONTAL SYNC
8	VERTICAL SYNC



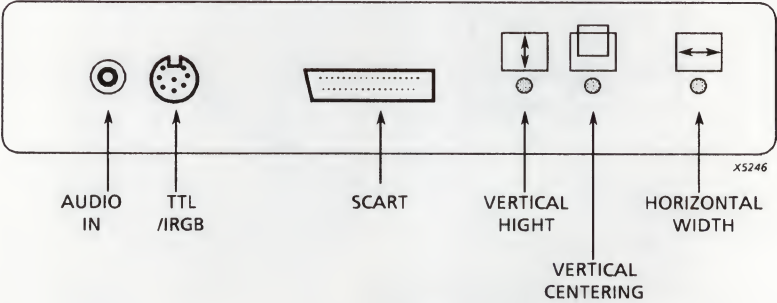
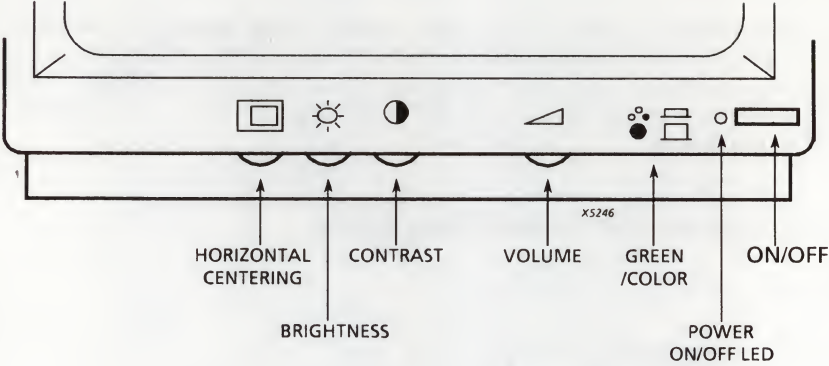
REAR VIEW

#### SCART Connector

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	N.C.	12	N.C.
2	N.C.	13	GROUND
3	N.C.	14	N.C.
4	GROUND	15	RED VIDEO
5	GROUND	16	N.C.
6	N.C.	17	GROUND
7	BLUE VIDEO	18	N.C.
8	N.C.	19	N.C.
9	GROUND	20	COMP. SYNC.
10	N.C.	21	N.C.
11	GREEN VIDEO		



REAR VIEW



### **21.13.5. Installation/Maintenance Philips Colour Monitor**

The monitor power cable may be connected to the IEC outlet on the rear of the system, or to a separate wall socket. When connecting the monitor to the system, be sure that both monitor and system are switched off. The video cable should be connected to a suitable colour board (CGA- or compatible controller).





## 21.14. MULTI-FREQUENCY COLOUR MONITOR 8CM875

### 21.14.1. Characteristics Multi-frequency Colour Monitor 8CM875

The 8CM875 is a high resolution, multi-frequency colour monitor. It has a screen size of 14", and provides a 3,000 character display. The monitor supports CGA, EGA and VGA video modes.

### 21.14.2. Connections Multi-frequency Colour Monitor 8CM875

The monitor comprises a 9-pin, D-type connector located on the rear panel. This connector is used as input for both TTL and analogue operation of the monitor. The mode of operation must match the type of video controller being used, and the TTL/analogue switch on the rear panel of the monitor must be in the correct position (refer to the following page).

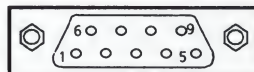
Video Connector (TTL)

PIN No.	SIGNAL NAME
1	GND
2	Rb
3	R
4	G
5	B
6	Gb
7	Bb
8	HSYNC
9	VSYNC

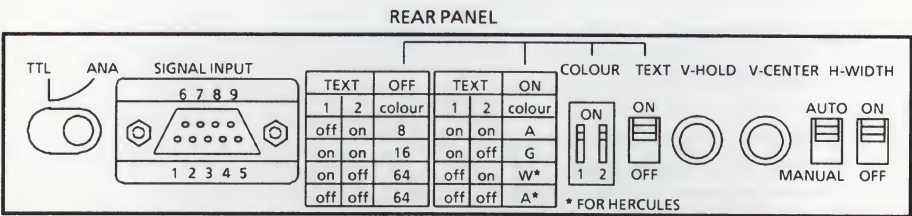
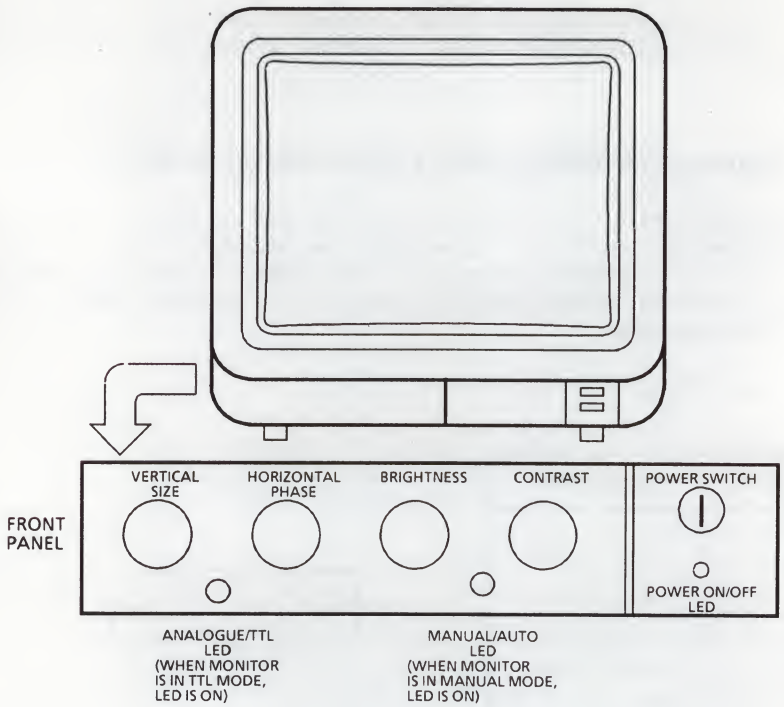


Video Connector (Analogue)

PIN No.	SIGNAL NAME
1	R
2	G
3	B
4	HSYNC
5	VSYNC
6	GND
7	GND
8	GND
9	GND



Locator



- A = AMBER
- G = GREEN
- W = WHITE
- \* = HERCULES MODE

x5588

#### **21.14.5. Installation/Maintenance Multi-frequency Colour Monitor 8CM875**

The monitor power cable should be connected to the IEC outlet on the rear of the system. The monitor video cable must be connected to the video controller output (take care that the video controller switch settings are correct and that the TTL/analogue switch on the rear panel of the monitor is in the correct position). When connecting the monitor to a VGA analogue controller use the special 15-pin to 9-pin adapter cable supplied with the monitor; when the monitor is connected to a VGA TTL controller use the standard 9-pin to 9-pin interface cable, also supplied with the monitor.





CM 8873/05G

**Inleiding**

Dit is een kleurenmonitor, specifiek voor gebruik met personal computers.

De toepassingsmogelijkheden zijn zeer groot vanwege de automatische omschakeling naar verschillende lijn- en rasterfrequenties.

Deze automatische omschakeling maakt de monitor geschikt voor toepassingen waarbij men van speciale video interface-kaarten gebruik maakt. Zoals b.v. E.G.A. en P.G.A.-kaarten.

**Plaatsing/Ventilatie**

Om oververhitting te voorkomen mogen de ventilatie-openingen in de monitor niet afgedekt worden.

De monitor mag niet bij een warmtebron geplaatst worden en evenmin op een zachte ondergrond omdat hierdoor de ventilatie-openingen aan de onderkant worden afgesloten.

**Aansluiten op de netspanning**

U kunt de monitor aansluiten op een netspanning van 220 tot 240 V. Is de netspanning in uw huis afwijkend, raadpleeg dan uw handelaar.

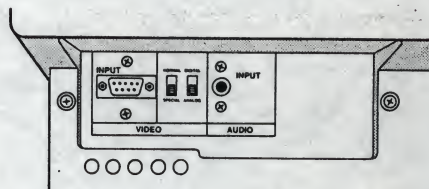
**Aansluiting van de computer**

Uw monitor is voorzien van een aansluiting voor de invoer van video en audio signalen. Op elke aansluiting is functie aangegeven.

Huis en personal computers hebben verschillende aansluitmogelijkheden voor video en audio signalen.

Door middel van funktieschakelaars kan de monitor aangepast worden aan verschillende signaaltypes:

- Analooeg RGB (Lineair)
- Digitaal RGB (TTL) 16 kleuren
- Digitaal RGB (TTL) 64 kleuren.

**Aansluitingen (achterwand)****9-polige D-shell connector**

Voor aansluiting van een computer.

CH 18853 / 02 G

1. (continued from page 1)

2. (continued from page 1)

3. (continued from page 1)

4. (continued from page 1)

5. (continued from page 1)

6. (continued from page 1)

7. (continued from page 1)

8. (continued from page 1)

9. (continued from page 1)

10. (continued from page 1)

11. (continued from page 1)

12. (continued from page 1)

13. (continued from page 1)

14. (continued from page 1)

15. (continued from page 1)

16. (continued from page 1)

17. (continued from page 1)

18. (continued from page 1)

19. (continued from page 1)

20. (continued from page 1)



Hiervan wordt de pinbezetting vermeldt in onderstaande tabel:

Pin no.	DIGITAL RGB		ANALOG RGB
	16 colors (NORMAL)	64 colours (SPECIAL)	
1	ground	ground	ground
2	—	2nd red	⚠
3	red	1st red	red
4	green	1st green	green
5	blue	1st blue	blue
6	intensity	2nd green	
7	composite sync. (0,3-1V <sub>PP</sub> /750hm, negative)	2nd blue	composite sync. (0,3-1V <sub>PP</sub> /750hm, negative)
8	horizontal sync./ composite sync. TTL	horizontal sync./ composite sync. TTL	horizontal sync./ composite sync. TTL
9	vertical sync. TTL	vertical sync. TTL	vertical sync. TTL

#### AUDIO IN (CINCH type)

Voor aansluiting van een signaalbron met een geluid (audio) signaaluitgang.

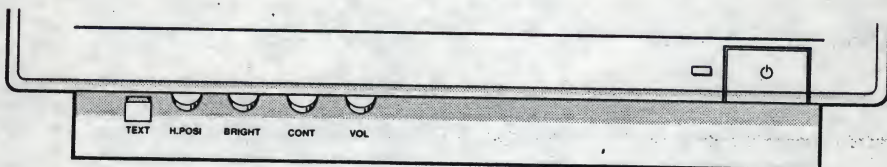
⚠ Sommige kabels v/h systeem hebben audio op pin 2, deze moet dan met een cinch-kabeltje op audio-in gebrast worden.

#### Aansluiting (linkerwand)

##### Hoofdtelefoon

Aan de linkerkant van uw monitor vindt u een 3,5 mm jack plug aansluiting voor de hoofdtelefoon.

#### Bediening

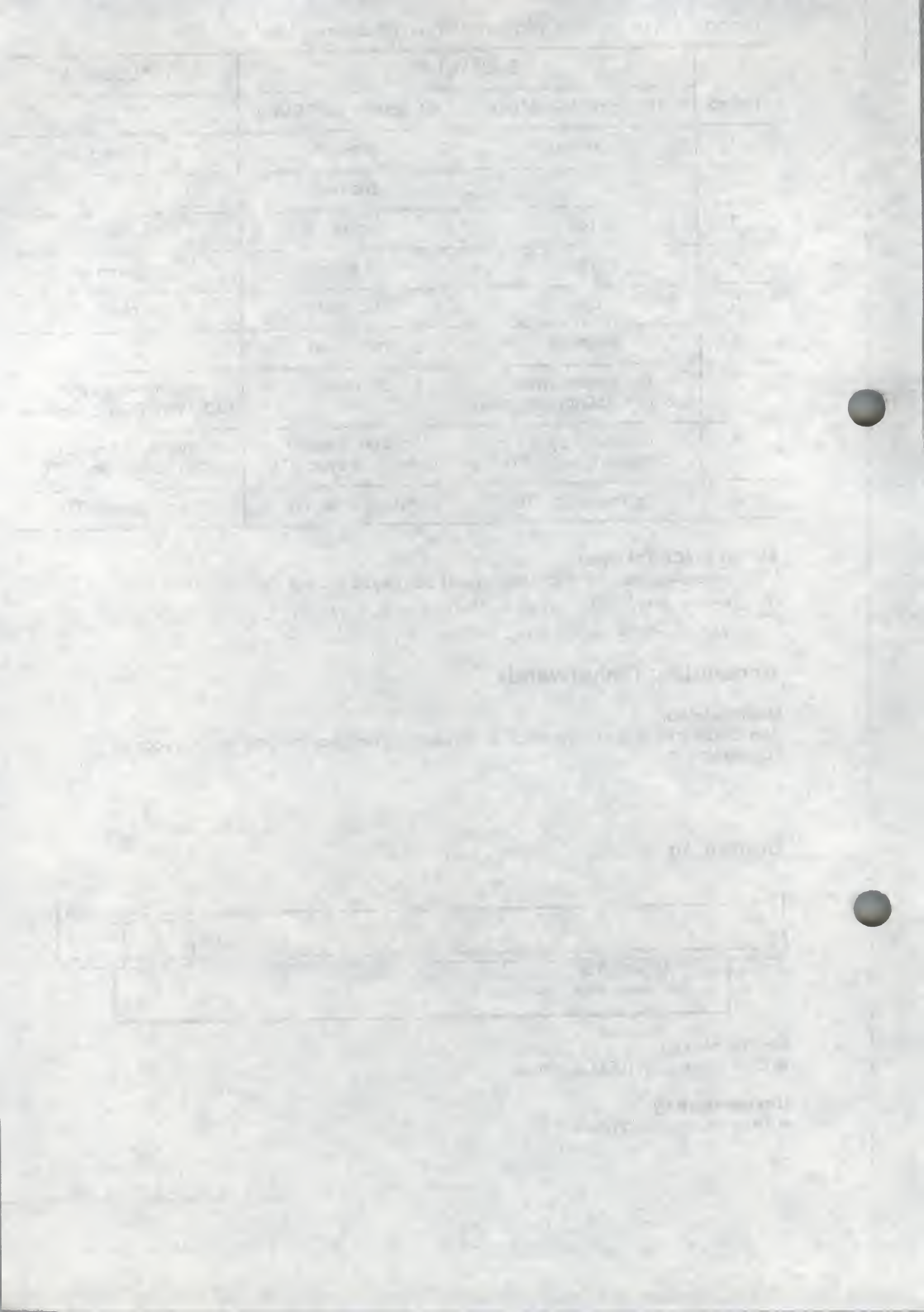


##### Inschakelen ①

- Druk toets ① in (LED brandt).

##### Uitschakelen ①

- Druk toets ① nogmaals in.





## Beeld en geluidregelaars

Voor het verkrijgen van een optimale instelling van de video en audio ingangssignalen zijn diverse regelaars aanwezig.

- Afhankelijk van de situatie kunt u het beeld horizontaal van links naar rechts centreren met knop H.POSI.
- Regel de helderheid met knop BRIGHT.
- Regel het contrast met knop CONT.
- Regel het geluid met knop VOL.
- Met toets TEXT kunt u overschakelen naar groene letters (bij gebruik van tekstverwerking).

## Technische specificaties

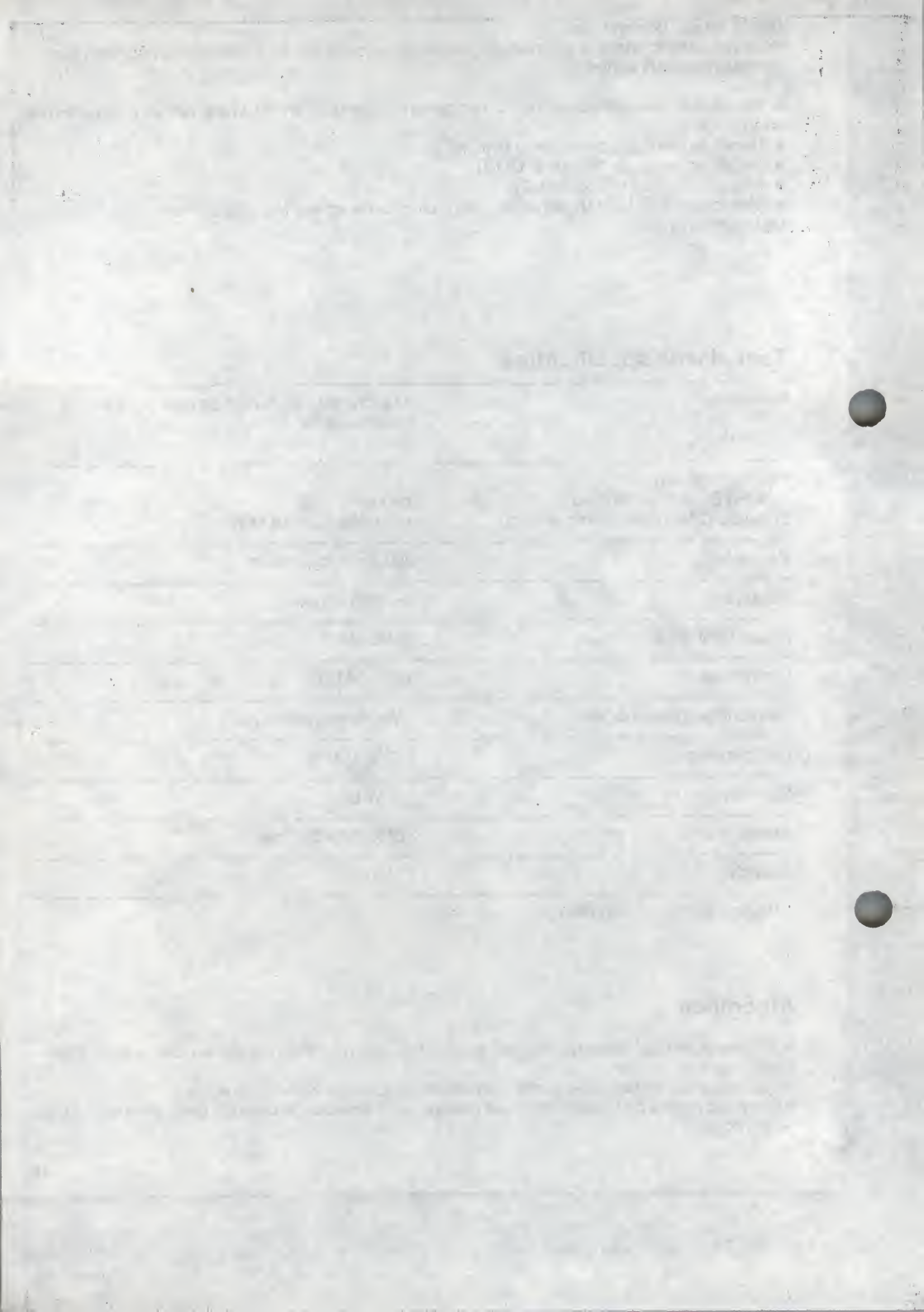
Beeldbuis	: 14 inch, dotted, pitch 0,31 mm, donker beeldscherm
Deflektie	: 90°
Ingangssignalen	
1) 9-pin D-shell aansluiting	: zie specificatie
2) Audio CINCH aansluiting (mono)	: 150 mV-2 Veff/10 kOhm
Resolutie	: 850 lijnen in centrum
Karakters	: > 4000 karakters
Rasterfrequentie	: 50/60 Hz
Lijnfrequentie	: 15,6 - 34 kHz <i>multi-sync</i>
Geluiduitgangsvermogen	: 1 W-5% vervorming
Netspanning	: 230 V $\pm$ 15%
Stroomverbruik	: 100 W typ.
Afmetingen (h x b x d)	: 328 x 360 x 385 mm
Gewicht	: 13 kg

\* Wijzigingen voorbehouden.

## Algemeen

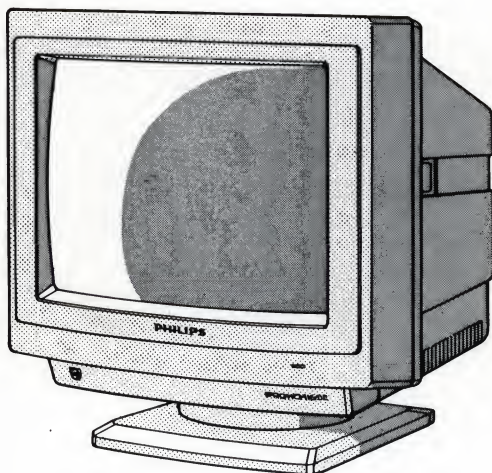
- Wanneer de beeldkwaliteit niet als gewenst is, controleer dan of alle regelaars in de juiste stand staan.
- De achterwand mag alleen door een service-technicus verwijderd worden.
- Zonodig kunt u de monitor reinigen met een vochtige zeem. Gebruik geen alcohol, spiritus of ammonia.







# PHILIPS



*Dual Prog.  
VGA*

**6CM3209**

**7CM3209**

**6CM3279**

**7CM3279**

Professional colour monitor

Professioneller Farbmonitor

Moniteur couleur professionnel

Professionele kleurenmonitor

Monitore professionale a colori

Monitor profesional en color

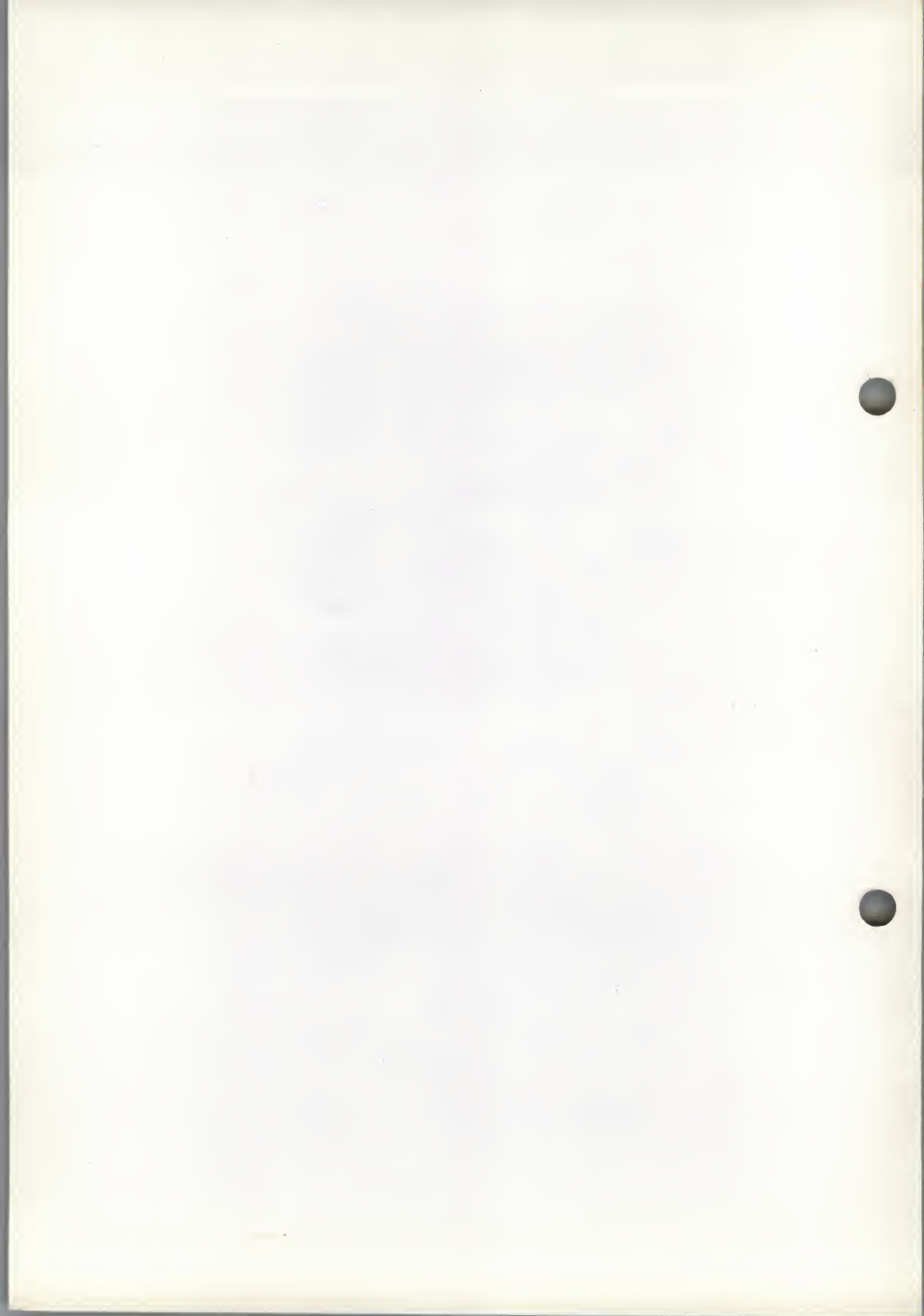
Monitor de cores profissional

Professionel farve-monitor

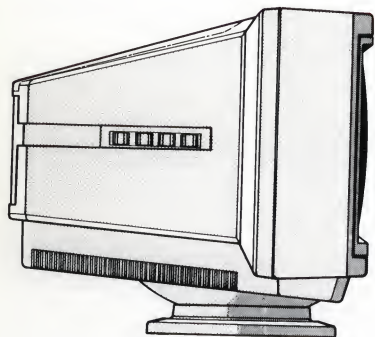
Profesjonell fargemonitor

Professionell färgmonitor

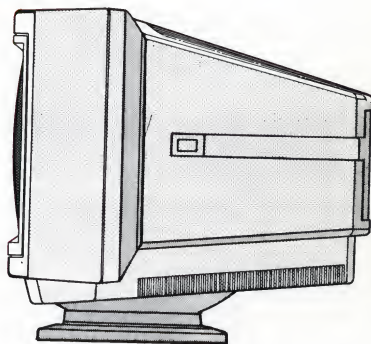
Värimonitori



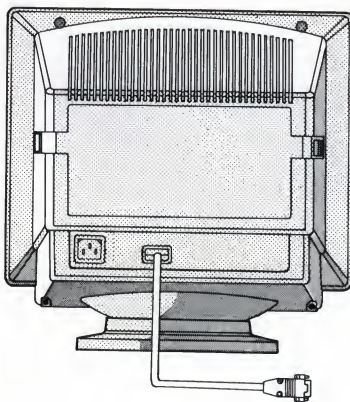
2



1

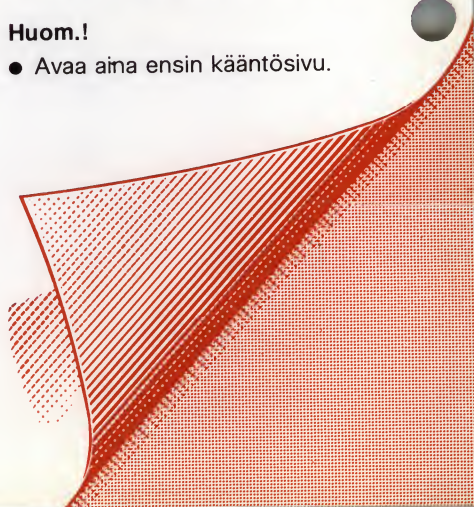


3





<b>English</b>	<b>Operating instructions</b> Page 1-5	<b>Attention!</b> ● Always open this flap page first.
<b>Deutsch</b>	<b>Bedienungsanleitung</b> Seite 6-9	<b>Achtung!</b> ● Immer zuerst dieses Umschlagblatt öffnen.
<b>Français</b>	<b>Mode d'emploi</b> Page 10-14	<b>Attention!</b> ● Commencez toujours par ouvrir ce rabat.
<b>Nederlands</b>	<b>Gebruiksaanwijzing</b> Pagina 15-18	<b>Attentie!</b> ● Altijd eerst deze flap openslaan.
<b>Italiano</b>	<b>Istruzioni per l'uso</b> Pagina 19-22	<b>Attenzione!</b> ● Aprire sempre prima questa pagina pieghevoile.
<b>Español</b>	<b>Instrucciones de manejo</b> Página 23-26	<b>¡Atención!</b> ● Abrase siempre antes que nada esta página.
<b>Português</b>	<b>Modo de emprego</b> Página 27-30	<b>Atenção!</b> ● Abra sempre em primeiro lugar esta página desdobrável.
<b>Dansk</b>	<b>Betjeningsvejledning</b> Side 31-34	<b>Bemærk!</b> ● Denne klapside skal altid slås op som noget af det første.
<b>Norsk</b>	<b>Bruksanvisning</b> Side 35-38	<b>Merk!</b> ● Denne klaffsiden må alltid åpnes først.
<b>Svenska</b>	<b>Bruksanvisning</b> Sidan 39-42	<b>Obs!</b> ● Slå alltid upp den här fliken först.
<b>Suomi</b>	<b>Käyttöohje</b> Sivu 43-46	<b>Huom.!</b> ● Avaa aina ensin kääntösivu.





**GB IDENTITY CARD**

This card, together with the terms of guarantee (to be provided by your dealer), forms the full certificate of guarantee for this appliance.

**D GERÄTE-  
KENNKARTE**

Diese Karte ist, zusammen mit den Garantiebestimmungen, die Ihr Händler Ihnen aushändigt, Ihr Garantieschein für dieses Gerät.

**F CARTE  
D'IDENTIFI-  
CATION**

Associée aux conditions de garantie (qui vous sont remises par le revendeur), cette carte constitue le certificat de garantie de cet appareil.

**NL IDENTIFI-  
CATIEKAART**

Deze kaart vormt, samen met de garantievoorwaarden (welke door uw dealer verstrekt worden), het garantiebewijs voor dit apparaat.

**I CARTE D'IDENTIFI-  
CAZIONE**

Questa cartolina rappresenta insieme alle condizioni di garanzia (da consegnare dal vostro rivenditore) il documento di garanzia per questo apparecchio.

**E TARJETA DE  
IDENTIFICACIÓN**

La garantía de este aparato se compone de esta tarjeta y de las condiciones de garantía que le entregará su concesionario.

**P CARTÃO DE  
IDENTIFICAÇÃO**

Este cartão, em conjunto com as condições de garantia em vigor (explicadas pelo seu vendedor) constituem o certificado de garantia do seu aparelho.

**DK I.D. KORT**

Dette kort, udfyldt af Deres forhandler, er tilstrækkelig garantidokumentation for dette apparat.

**N IDENTIFIKA-  
SJOSKORT**

Dette kort, sammen med garantibetingelsene (som De får av forhandleren) utgjør garantibeviset for dette apparat.

**S IDENTIFIERINGS-  
KORT**

Detta kort tillsammans med garantivillkoren, som Du får av radiohandlaren, utgör ett fullständigt garantibevis för denna produkt.

**SP TUNNISTUS-  
KORTTI**

Tämän laitteen takuutodistus muodostuu tästä kortista ja takuuehdoista (jälleenmyyjä antaa mukaan).

**GR ΔΕΛΤΙΟ  
ΤΑΥΤΟΤΗΤΑΣ**

Η καρτέλλα αυτή μαζί με τους όρους εγγυήσεως (που θα προμηθευθείτε από το κατάστημα που αγοράσατε την συσκευή), αποτελούν το πλήρες πιστοποιητικό εγγυήσεως της συσκευής σας.

**PHILIPS**

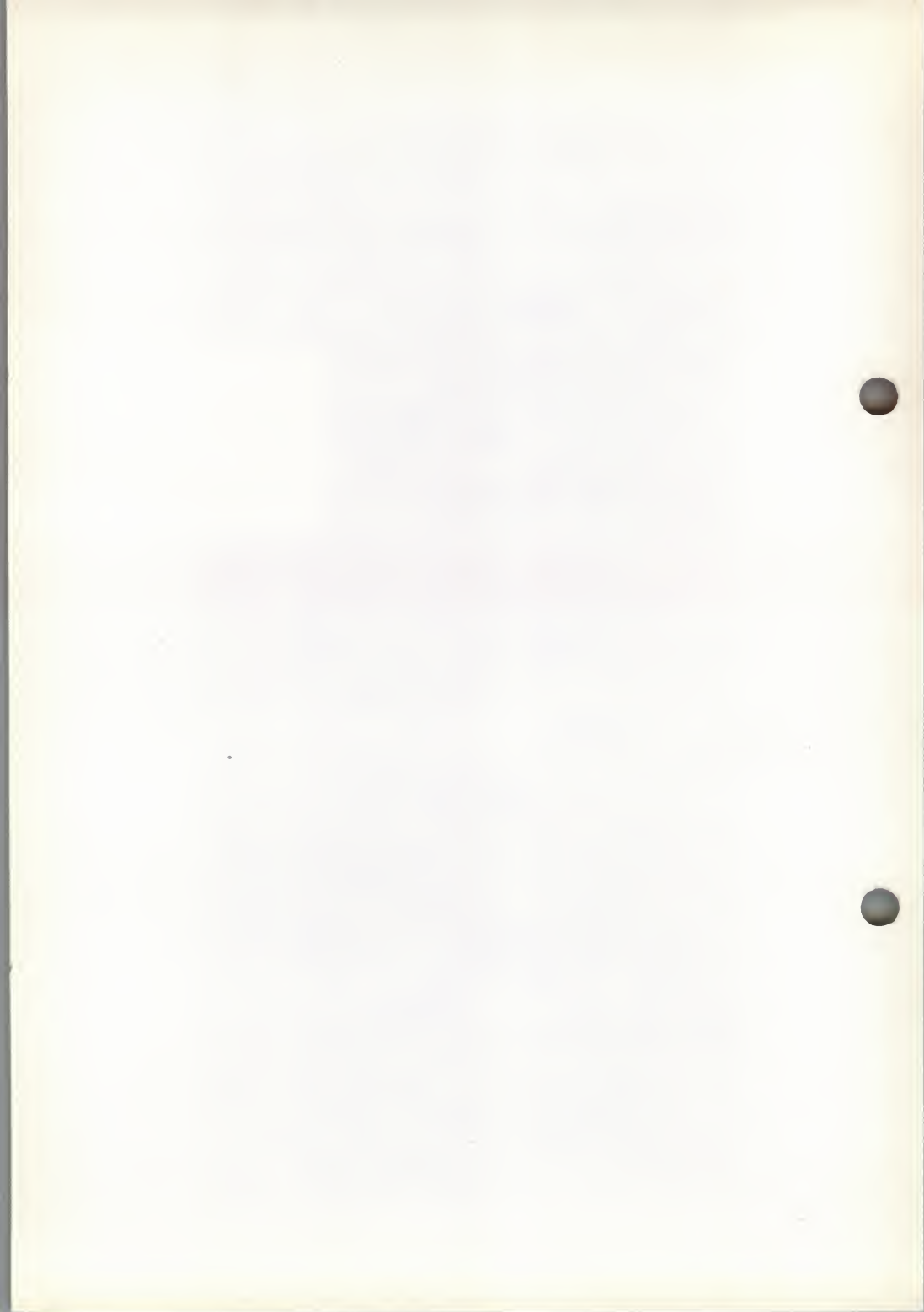


TYPE NO. 6CM3209/00T  
220-240V ~ 50Hz 0.5AMP

**PHILIPS**



MADE IN TAIWAN  
NR.TY009028 009775



## Introduction

This Dual VGA\* colour monitor works with your IBM\* PC, PC/XT, PC/AT, PS/2\* or compatible system that is fitted with a VGA interface card, and can display high-resolution graphics and text images in VGA and VGA Plus modes.

An optional VGA interface card which is specifically designed for the monitor is available on order. Please consult your dealer for details.

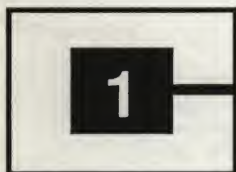
Before installing this monitor, please refer to the user's guides of your computer and interface card to make sure if any change of setting is necessary.

\* Registered or unregistered trade marks referred to:

IBM: International Business Machines Corp.  
PS/2: Personal System/2  
VGA: Video Graphics Array

## Important

**Check the technical information chart for the exact specifications of your monitor.**



The drawings in the text are accompanied by figures, e.g. **1**. These correspond to the figures on the fold-out flap. This enables you to easily find the corresponding buttons on the monitor.

## Information for users in the UK

(not applicable outside the UK)

### Service for you

The legal responsibility for meeting any in-guarantee service needs for your monitor rests with the dealer from whom you bought it. Our own Service Division - Philips Service - provides your dealer with comprehensive technical advice, and distributes approved spare parts from Service Centres throughout the country. If your dealer has no service facilities, he can arrange for any work to be carried out by a competent third party organization.

### Free Service for 12 months:

The dealer from whom the monitor was purchased will arrange for any defect in manufacture or material to be rectified without charge for a period of 12 months from the date of initial consumer sale provided:

- . reasonable evidence is supplied that the set was purchased within 12 months prior to the date of claim.
- . the defect is not due to use of the monitor on an incorrect voltage or contrary to the Company's Operating Instructions or to accidental damage (whether in transit or otherwise); misuse; neglect; unauthorized or inexperienced modification or repair.

The picture tube of your monitor is separately guaranteed for 12 months by Philips Service.

### Service after 12 months:

Continuing service after 12 months is available in the same way but the service will be chargeable. These statements do not affect your statutory rights as a consumer.

### IMPORTANT

#### WARNING:

#### THIS APPARATUS MUST BE EARTHED.

This can be achieved by fitting a 3 pin plug. The wires in the earthed mains lead are coloured according to the following code

BLUE = NEUTRAL

BROWN = LIVE

GREEN/YELLOW = EARTH

If the mains plug (or adaptor) contains a fuse, the value of this fuse should be 3 Amp. Alternatively, if another type of plug (not fused) is used, the fuse at the distribution board should not be greater than 5 Amp.

If the colours of the wires in the mains lead do not correspond with the coloured markings identifying the terminals in your plug, proceed as follows...

The BLUE wire should be connected to the terminal marked 'N' or coloured black.

The BROWN wire should be connected to the terminal marked 'L' or coloured red.

The GREEN and YELLOW wire must be connected to the terminal in the plug marked by 'E' or the earth symbol  $\perp$ , or coloured green or green and yellow.

Before replacing the plug cover, make certain that the cord grip is clamped over the sheath of the lead - not simply over the three wires.

## Installation

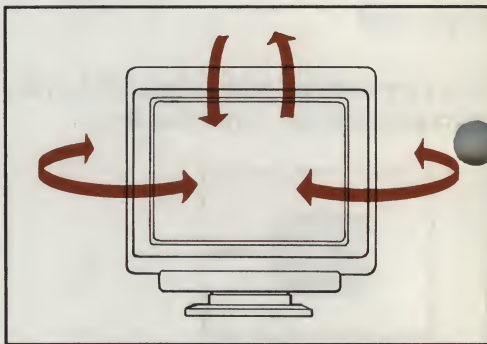
### Positioning/Ventilation

WARNING: WHEN POSITIONING THIS EQUIPMENT ENSURE THAT THE MAINS PLUG AND SOCKET IS EASILY ACCESSIBLE.

Do not place the monitor near a source of heat. To prevent overheating, ensure that the ventilation openings of the monitor are not covered.

### Pedestal

The built-in pedestal is designed to provide various viewing angles of the monitor for your convenience. You can tilt the monitor within the range of between 5° forward and 15° backward, and/or turn it 90° to the right or left.

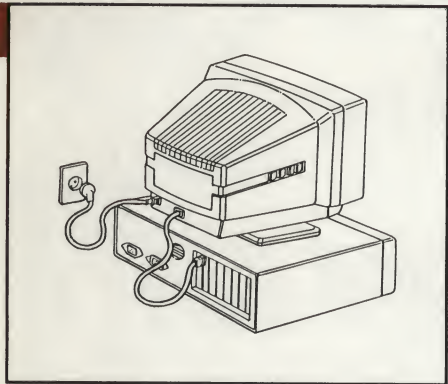




## Connection to the Mains

You can connect the monitor to a mains supply of between 220 and 240 V. If the voltage in your home is different from this, consult your dealer. Connect one end of the mains cord to the mains socket at the rear of the monitor, and the other end to the mains supply.

3

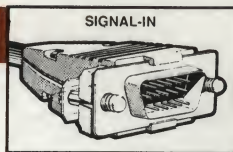


## Connection to the Computer

This monitor is equipped with a 15-pin D-shell signal cable which can be connected to the video connector on the VGA card on the computer. Secure the signal cable to the connector with the screws on the plug.

**Note:** The monitor has a self-test facility whereby the screen lights up whenever the signal cable is disconnected.

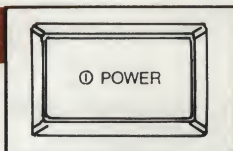
3



## Switching on/off

(on the right panel)

1



### Switching on ①

- Press button ①, the LED indicator at the front lights up.

### Switching off ①

- Press button ① again, the LED indicator is off.



## Adjustment

(on the left panel)

If necessary, you can make the following adjustments to obtain an optimum picture quality.

2



### CONTR. ●

- Adjust contrast with knob ● .

### BRIGHT. ☀

- Adjust brightness with knob ☀ .

### H. Shift □

- The image may be positioned horizontally with knob □ .

### V. Shift ▢

- The image may be positioned vertically with knob ▢ .

## Safety Precautions & Maintenance

- The rear panel should only be removed by a service technician.
- If necessary, clean with a slightly damp sponge. Do not use alcohol or ammonia.
- Never expose the monitor to rain or excessive moisture to reduce the risk of fire or shock.

# Technical Information

## (I) General specifications:

Picture tube : 14 inch, 90° deflection, non-glare, black matrix, light transmission 57%, dotted pitch 0.28 mm, low radiation treatment (for 6CM3279 & 7CM3279 only.)

### Line(Horizontal) frequency

6CM3209 : 31.5 / 37.8 KHz

6CM3279 : 31.5 / 37.8 KHz

7CM3209 : 31.5 / 35.2 KHz

7CM3279 : 31.5 / 35.2 KHz

### Raster(Vertical)

frequency : 50 - 87 Hz.

Mains voltage : 220 - 240 VAC

### Power

consumption : 80 watt typical

Video bandwidth : 32 MHz, at -3 dB

Resolution :

(1) VGA mode, horizontal freq. at 31.5 KHz; non-interlace.

640 x 350 pixels (EGA emulation) / 70 Hz.

640 x 400 pixels (VGA) / 70 Hz.

640 x 480 pixels (VGA) / 60 Hz.

(2) VGA Plus mode, horizontal freq. at 37.8 KHz, or 35.2 KHz; non-interlace.

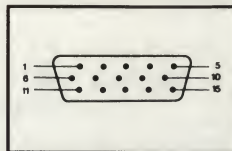
800 x 600 pixels: 37.8 KHz, 60 Hz  
35.2 KHz, 56 Hz

### Unit

dimension : 359 x 356 x 395 mm

Net weight : 14 Kg

## (II) Input signal:



Analog RGB input via 15-pin D-shell signal cable, pin assignment as follows:

Pin No.	Assignment
1	Red video input
2	Green video input
3	Blue video input
4	Ident output
	- connected to pin 10
5	Self-test input
6	Red video ground
7	Green video ground
8	Blue video ground
9	Not connected - no pin
10	Logic ground
11	Ident output
	- connected to pin 10
12	Ident output
	- not connected
13	Horizontal Sync
14	Vertical Sync
15	Not connected

\* Because of a policy of continuous product improvement, the above specifications are subject to change without notice.

## Einleitung

Der Dual-VGA\*-Farbmonitor arbeitet mit IBM\* PCs, PC/XTs, PC/ATs, PS/2\* oder kompatiblen Systemen, die mit einer VGA-Karte ausgestattet sind; der Monitor eignet sich zur Darstellung von hochauflösenden Grafiken und Texten im VGA- und VGA-Plus-Betrieb.

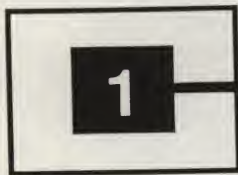
Vor Installation des Monitors im Bedienungshandbuch des Computers und des Schnittstellenmoduls nachschauen, ob irgendwelche Einstellungen verändert werden müssen.

\* Warenzeichen im Text:

IBM: International Business Machines Corp.  
PS/2: Personal System/2  
VGA: Video Graphics Array

## Wichtig!

Lesen Sie bitte vor Inbetriebnahme Ihres Monitors das Technische Informationsblatt mit den genauen Technischen Daten Ihres Geräts.



Neben den Zeichnungen im Text stehen Ziffern, z.B. **1**, die den Ziffern auf dem Ausklappblatt entsprechen. So können Sie die betreffenden Tasten an Ihrem Monitor mühelos finden.

## Installation

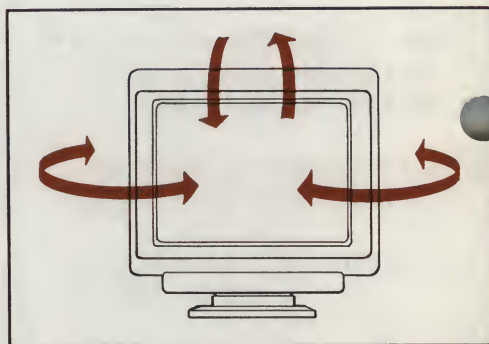
### Aufstellung/Belüftung

**ACHTUNG: BEIM AUFSTELLEN DES MONITORS DARAUF ACHTEN, DASS DER STECKER UND DER EINGANG FÜR DIE NETZSPANNUNG LEICHT ZUGÄNGLICH SIND.**

Den Monitor nicht in der Nähe einer Wärmequelle aufstellen. Um Überhitzung des Geräts zu vermeiden, darauf achten, daß die Lüftungsöffnungen nicht verdeckt werden.

### Fuß

Mit dem eingebauten Fuß kann der Monitor zur Erhöhung des Bedienungskomforts in verschiedene Winkel gedreht werden. Sie können Ihren Monitor um 5° nach vorn und um 15° nach hinten schwenken sowie um 90° nach links und rechts drehen.





## Inleiding

Dit Dual VGA kleuren beeldscherm is aan te sluiten op IBM PC, PC/XT, PC/AT, PS/2 en systemen die hiermee compatible zijn. De systemen moeten uitgerust zijn met een VGA-interface kaart en moeten de mogelijkheid hebben hoge resolutie graphics en teksten af te beelden in VGA en VGA-Plus modes.

Een optionele VGA-kaart, speciaal ontwikkeld voor dit beeldscherm, is op bestelling leverbaar. Voor nadere informatie, raadpleeg de dealer.

Alvorens deze monitor te installeren, gelieve u de gebruiksaanwijzing van uw computer en interfacekaart te raadplegen om te weten of sommige instellingen moeten worden aangepast.

\* Handelsmerken waaraan gerefereerd wordt:

IBM: International Business Machines Corp.  
PS/2: Personal System/2  
VGA: Video Graphics Array

## Belangrijk!

Kijkt u, alvorens tot gebruik over te gaan, in de technische informatie lijst voor de exacte specificaties van uw monitor.



Bij de tekeningen in de tekst zijn cijfers toegevoegd, bijv. **1**. Deze verwijzen naar dezelfde cijfers op het uitklapblad. Hiermee kunt u de betreffende toetsen op de monitor gemakkelijk vinden.

## Installeren

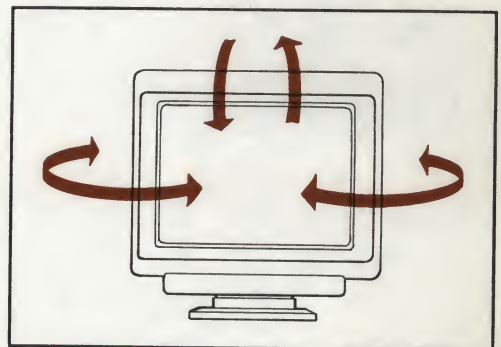
### Plaatsing/Ventilatie

**WAARSCHUWING: VERZEKER U ERVAN DAT DE STEKKER EN DE NETSPANNINGSINGANG GEMAKKELIJK BEREIKBAAR ZIJN BIJ HET PLAATSEN VAN HET BEELDSCHERM.**

Plaats het beeldscherm niet in de buurt van een warmtebron. Om oververhitting te voorkomen, dient u ervoor te zorgen dat de ventilatie openingen in het beeldscherm altijd vrij zijn.

### Draaibare voet

De ingebouwde voet is ontworpen om het mogelijk te maken Uw beeldscherm onder verschillende hoeken te gebruiken ter verhoging van het comfort. U kunt het beeldscherm over een hoek van 5 graden naar voren kantelen, 15 graden naar achteren kantelen en 90 graden naar links - en rechts draaien.



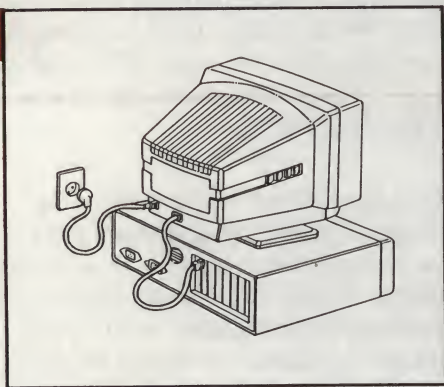
## Aansluiting op de netspanning

Het beeldscherm is geschikt voor een spanning tussen de 220 en 240 V.

Indien de netspanning in Uw huis verschilt van deze waarden, raadpleeg dan Uw dealer.

Verbindt één (1) uiteinde van de spanningskabel met de spannings-ingang aan de achterzijde van het beeldscherm en steek het andere eind in een stopkontakt.

3

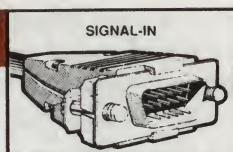


## Verbinding met de computer

Dit beeldscherm is uitgerust met een 15-pens D-shell signaalkabel, welke bevestigd kan worden aan de beelduitgang van de VGA-kaart op de computer. Bevestig de signaal kabel aan de connector met behulp van de schroeven op de stekker.

**Opmerking:** Het beeldscherm heeft een self-test faciliteit, welke het scherm doet oplichten iedere keer dat een verbinding wordt verbroken.

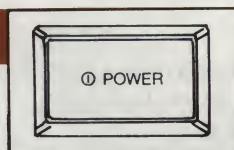
3



## In-/Uitschakelen

(op het rechter paneel)

1



### Inschakelen ①

• Druk toets ① in. De LED aan de voorkant van het scherm licht op.

### Uitschakelen ①

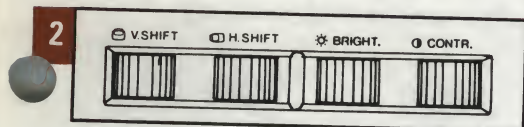
• Druk normaal toets ① in. De LED aan de voorzijde van het beeldscherm gaat uit.



## Instellen

(op het linker paneel)

Het is mogelijk de volgende dingen bij te stellen om een optimale beeldkwaliteit te verkrijgen:



### CONTR. ●

- Regel het contrast met knop ●.

### BRIGHT. ☀

- Regel de helderheid met knop ☀.

### H. SHIFT □

- Afhankelijk van de situatie kunt u het beeld horizontaal van links naar rechts centreren met knop □.

### V. SHIFT ▢

- Afhankelijk van de situatie kunt u het beeld vertikaal van boven naar beneden centreren met knop ▢.

## Veiligheidsvoorschriften en onderhoud

- De achterkant van het beeldscherm niet zelf verwijderen. Roep de hulp in van een erkende service monteur.
- Indien noodzakelijk kan het beeldscherm gereinigd worden met een vochtige spons. Gebruik nooit alcohol of ammoniak.
- Stel het beeldscherm nooit bloot aan regen of hoge luchtvochtigheid om het risico op een schok en om het brandgevaar te beperken.

# Technische informatie

## (I) Algemene specificaties:

Beeldbuis : 14 inch, 90° deflektie,  
niet reflecterend,  
zwarte matrix,  
licht transmissie 57%,  
dotted pitch 0,28 mm, met  
lage stralingsafgifte (geldt  
alleen voor de 6CM3279 en  
de 7CM3279).

### Lijnfrequentie(horizontaal)

6CM3209 : 31,5 / 37,8 KHz

6CM3279 : 31,5 / 37,8 KHz *10w. 2m*

7CM3209 : 31,5 / 35,2 KHz

7CM3279 : 31,5 / 35,2 KHz *10w. 2m*

Rasterfrequentie : 50 - 87 Hz.

(verticaal)

Netspanning : 220 - 240 VAC

Stroomverbruik : 80 watt typ.

Video-

bandbreedte : 32 MHz bij -3 dB

Resolutie :

(1) VGA mode, horizontale frequentie bij  
31,5 KHz; niet-geïnterliniëerd.

640 x 350 beeldpunten(EGA-emulatie), 70Hz

640 x 400 beeldpunten (VGA), 70 Hz

640 x 480 beeldpunten (VGA), 60 Hz

(2) VGA-Plus mode, horizontale frequentie bij  
37,8 KHz, 35,2 KHz; niet-geïnterliniëerd.

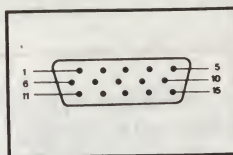
800 x 600 beeldpunten: 37,8 KHz, 60 Hz *6cm*  
35,2 KHz, 56 Hz *7cm*

Afmetingen : 359 x 356 x 395 mm

(h x b x d)

Netto gewicht : 14 Kg

## (II) Ingangs signaal:



Analoge RGB input met een 15-pens D-shell  
signaalkabel, pen functies als volgt:

<u>Pen No.</u>	<u>Functie:</u>
1	Video-input, rood
2	Video-input, groen
3	Video-input, blauw
4	Identificatie-output - aangesloten op pen 10
5	Zelftest-input
6	Video-aarding, rood
7	Video-aarding, groen
8	Video-aarding, blauw
9	Niet aangesloten - geen pen
10	Logische aarding
11	Identificatie-output - aangesloten op pen 10
12	Identificatie-output - niet aangesloten
13	Horizontale synchronisatie
14	Vertikale synchronisatie
15	Niet aangesloten

\* Door ons beleid van continue produkt  
verbetering, zijn wijzigingen in de  
bovengenoemde specificaties zonder  
voorafgaand bericht mogelijk.

## 22. KEYBOARDS

Section:

Page:

1. Technical Overview	22.1-1
1.1: Option Cross Reference Guide	22.1-1
1.2: Technical Data	22.1-2

2: Hi-Tek PC/XT (P2812-0xx)	22.2-1	22.2-1	n.a.	n.a.	n.a.	n.a.
3: Hi-Tek AT (P2813-000)	22.3-1	22.3-1	n.a.	n.a.	n.a.	n.a.
4: Keytronic (P2814-0xx)	22.4-1	22.4-5	22.4-6	n.a.	n.a.	n.a.
5: Terminal Keyboard (P2806-xxx)	22.5-1	22.5-1	n.a.	n.a.	n.a.	n.a.
6: Philips Keyboard (P2815-1xx)	22.6-1	22.6-5	n.a.	22.6-5	n.a.	n.a.
7: Honeywell Keyboard (P2814-0xx)	22.7-1	22.7-4	n.a.	n.a.	n.a.	n.a.

Subsection:

1 Characteristics	↑
2 Connections	↑
3 Strap Settings / Adjustments	↑
4 Modification History	↑
5 Installation / Maintenance	↑
6 Diagnostic Functions	↑

**NOTE:** n.a. means that this section is not available for this unit.





## 22.1. TECHNICAL OVERVIEW

### 22.1.1. Option Cross Reference Guide

OPTION	P 2 1 2 0	P 2 2 3 0	A V E N G	P31xx					P32xx					P33xx							P 3 4 6 4	P 3 4 0 0	P91xx								
				0	0	0	2	0	0	0	0	0	3	3	0	0	4	4	5	6			6	7	0	3	3	6	6	7	0
				1	2	5	0	0	0	2	4	0	8	1	2	5	8	0	0	1			0	0	0	0	5	5	5	0	0
2: Hi-Tek PC XT (P2812-0xx)				x	x	x	x	x	x	x																					
3: Hi-Tek AT (P2813-000)								x	x	x	x																				
4: Keytronic (P2814-0xx)	x	x					x	x	x	x	x	x		x	x			x							x	x					
5: Terminal Keyboard (P2806-xxx)																								x	x		x				
6: Philips Keyboard (P2815-0xx)							x	x	x	x	x	x		x	x	x		x					x	x	x	x					
7: Honeywell Keyboard (P2814-0xx)	x	x	x							x	x			x	x			x	x		x				x	x	x	x			



## 22.1.2. Technical Data

	HI-TEK PC/XT P2812-0xx	HI-TEK AT P2813-000	KEYTRONIC P2814-0xx	TERMINAL KEYBOARD P2806-xxx
Nr. of keys	83 84	84	101 102	106
Key Type	SP ST Normally Open	SP ST Normally Open	Normally Open	Normally Open
Key Life	1 x 10 <sup>8</sup> Depressions	1 x 10 <sup>8</sup> Depressions	1 x 10 <sup>8</sup> Depressions	
Auto Repeat	0.09 s after 0.5 s	0.09 s after 0.5 s	0.09 s after 0.5 s (only in mode 1)	
LED's	2:NUM LOCK CAPS LOCK	3:NUM LOCK CAPS LOCK SCROLL LOCK	3:NUM LOCK CAPS LOCK SCROLL LOCK	3:NUM LOCK CAPS LOCK SCROLL LOCK
Multi Key Rollover	Yes	Yes	Yes (NKRO)	Yes
Buffer Capacity	30 characters	16 characters	16 characters	
Power Consumption Voltage (V) Current (mA)	5 +/- 5% 500	5 +/- 5% 500	5 +/- 5% 350	
Dimensions Width (mm) Height (mm) Depth (mm)	451 38 194	451 38 194	19	487 57 180
Switchable modes			Mode 1 (PC XT) Mode 2 (AT) Mode 3 (AT)	
Pads	Separate Numeric Pad	Separate Numeric Pad	Separate Numeric and Cursor Pads	Separate Numeric and Cursor Pads

	<b>PHILIPS P2815-1xx</b>	<b>HONEYWELL P2814-0xx</b>
Nr. of keys	101/102	101/102
Key Type	Membrane	Membrane
Key Life	3 x 10 <sup>7</sup> Depressions	1 x 10 <sup>7</sup> Depressions
Auto Repeat	0.09 s after 0.5s	0.09 s after 0.5s
LED's	3:NUM LOCK CAPS LOCK SCROLL LOCK	3:NUM LOCK CAPS LOCK SCROLL LOCK
Multi Key Rollover	Yes	Yes
Buffer Capacity	16 characters	16 characters
Power Consumption Voltage (V) Current (mA)	5 +/- 3% 250	5 +/- 10% 250
Dimensions Width (mm) Height (mm) Depth (mm)	474 30 225	530 43 210
Switchable modes	Mode 1 (PC/XT) Mode 2 (AT) Mode 3 (AT)	
Pads	Separate Numeric and Cursor Pads	Separate Numeric and Cursor Pads



## 22.2. HI-TEK PC/XT (P2812-0xx)

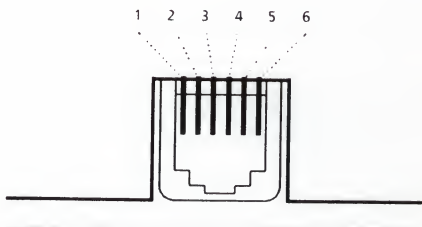
### 22.2.1. Characteristics Hi-Tek PC/XT

The Hi-Tek PC-83/PC-84 is an IBM compatible keyboard. The PC-84 version is used in the USA, while the PC-83 version is for all other areas.

### 22.2.2. Connections Hi-Tek PC/XT

Keyboard Connector

PIN	SIGNAL NAME
1	FRAME GND
2	DATA
3	+ 5 VDC
4	CLOCK
5	RESET - N
6	SIGNAL GND



X3/97





## 22.3. HI-TEK AT (P2813-000)

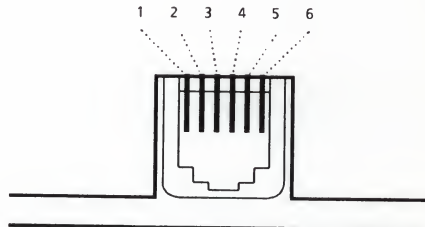
### 22.3.1. Characteristics Hi-Tek AT

The Hi-Tek AT-84 is an IBM compatible keyboard. The AT-84 generates other scan codes than the PC/XT keyboard (11 bit data stream). The keyboard is able to receive commands from the system.

### 22.3.2. Connections Hi-Tek AT

#### Keyboard Connector

PIN	SIGNAL NAME
1	FRAME GND
2	DATA
3	+ 5 VDC
4	CLOCK
5	RESET - N
6	SIGNAL GND



X3797



## **22.4. KEYTRONIC (P2814-0xx)**

### **22.4.1. Characteristics Keytronic**

There are two models: one with 101 keys and one with 102 keys. The 102 key model will be supported. The difference exists in a different configuration of the 'LEFT SHIFT' and 'ENTER' keys and one more function key (see next figures).

The keyboard is switchable to three modes:-

MODE 1: PC/XT protocol (9 bit data stream)

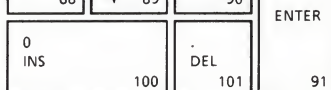
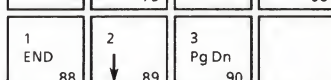
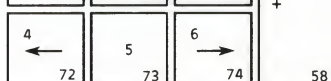
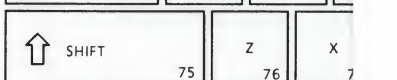
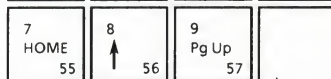
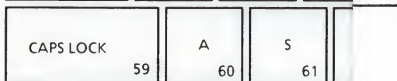
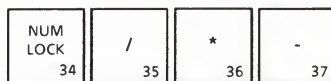
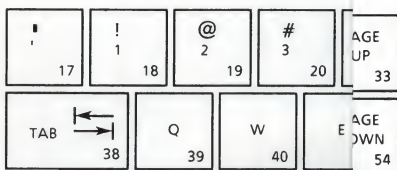
MODE 2: AT protocol (11 bit data stream)

MODE 3: AT protocol (11 bit data stream)

Dependent on the mode switch setting the keyboard delivers Scan Code Set 1 (PC/XT), Scan Code Set 2 (AT) or Scan Code Set 3 (AT).

See subsection 22.4.3. for switch settings.





x3053



F9	F10	F11	F12
10	11	12	13

PRINT SCREEN	SCROLL LOCK	PAUSE
14	15	16

NUM LOCK ☒	CAPS LOCK ☒	SCROLL LOCK ☒
------------------	-------------------	---------------------

28	+ =	←
29	30	

INSERT	HOME	PAGE UP
31	32	33

NUM LOCK 34	/	*	-
35	36	37	

{ [	} ]	↩
49	50	51

DELETE	END	PAGE DOWN
52	53	54

7 HOME	8 ↑	9 Pg Up	+
55	56	57	

@ ,	# ;	
69	70	71A

4 ←	5	6 →	58
72	73	74	

1 END	2 ↓	3 Pg Dn	ENTER
88	89	90	

? /	↑
85	86

↑
87

0 INS	100	DEL	91
		101	

ALT GR	CTRL
95	96

←	↓	→
97	98	99

0 INS	100	DEL	91
		101	

X3054

## 22.4.2. Connections Keytronic

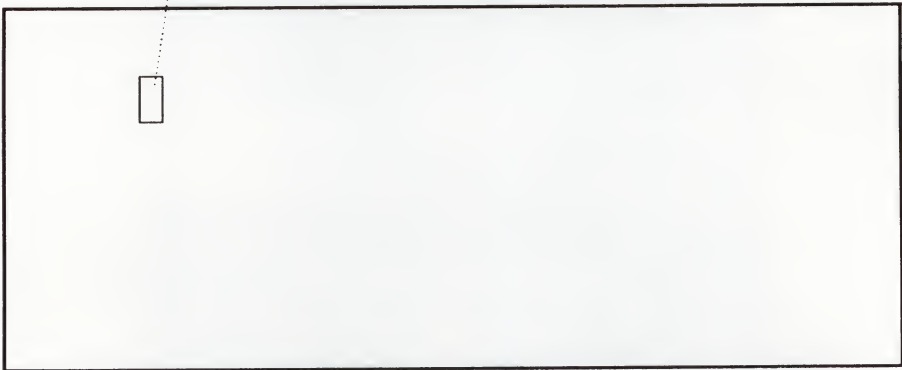
PIN	SIGNAL VOLTAGE	FUNCTION
1	TTL	CLOCK
2	TTL	DATA
3	--	N.C.
4	0 V	GROUND
5	+5 VDC	POWER

### 22.4.3. Strap Setting/Adjustments Keytronic

SWITCH 1	SWITCH 2	MODE
OFF	OFF	XT/AT Keyboard-mode is automatically selected by the keyboard
OFF	ON	XT/AT Keyboard-mode is automatically selected by the keyboard *)
ON	OFF	PC-XT
ON	ON	AT

\*) DEFAULT

Switch 3 and 4 are not used.



X3055

## **22.5. TERMINAL KEYBOARD (P2806-xxx)**

### **22.5.1. Characteristics Terminal Keyboard**

This keyboard is used with the terminal P2706.

### **22.5.2. Connections Terminal Keyboard**

There is one connector on the keyboard to connect to the P2706 terminal.

PIN	SIGNAL VOLTAGE	FUNCTION
3	TTL	CLOCK
1	TTL	DATA
4	0 V	GROUND
2	+ 5 VDC	POWER





## **22.6. PHILIPS KEYBOARD (P2815-1xx)**

### **22.6.1. Characteristics Philips Keyboard**

There are two models: one with 101 keys and one with 102 keys. The 102 key model will be supported. The difference exists in a different configuration of the 'LEFT SHIFT' and 'ENTER' keys and one more function key (see next figures).

The keyboard is switchable to three modes:-

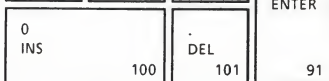
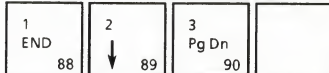
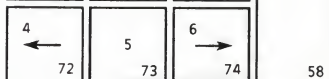
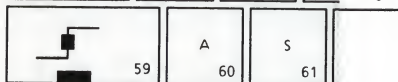
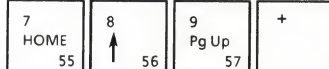
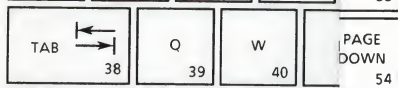
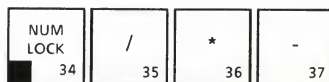
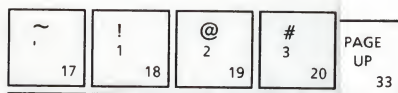
MODE 1: PC/XT protocol (9 bit data stream)

MODE 2: AT protocol (11 bit data stream)

MODE 3: AT protocol (11 bit data stream)

The keyboard-mode is automatically selected by the keyboard.





X3056

9	F10	F11	F12
10	11	12	13

PRINT SCREEN	SCROLL LOCK	PAUSE
14	15	16

--	--	--	--

28	+ =	←
29		30

INSERT	HOME	PAGE UP
31	32	33

NUM LOCK	/	*	-
34	35	36	37

{ [	} ]	←
49	50	51

DELETE	END	PAGE DOWN
52	53	54

7 HOME	8 ↑	9 Pg Up	+
55	56	57	

@ 	#	
69	70	71B

4 ←	5	6 →	
72	73	74	58

? /	⏏
85	86

↑
87

1 END	2 ↓	3 Pg Dn	ENTER
88	89	90	

ALT GR	CTRL
95	96

←	↓	→
97	98	99

0 INS	.DEL	
100	101	91

X3057

## 22.6.2. Connections Philips Keyboard

PIN	SIGNAL VOLTAGE	FUNCTION
1	TTL	CLOCK
2	TTL	DATA
3	--	N.C.
4	0 V	GROUND
5	+ 5 VDC	POWER

## 22.6.4. Modification History Philips Keyboard

SI-NR	SUBJECT
P3200-037	Introduction enhanced keyboard P2815-XXX





## **22.7. HONEYWELL (P2814-0xx)**

### **22.7.1. Characteristics Honeywell Keyboard**

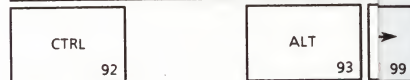
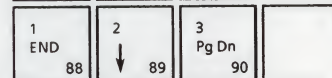
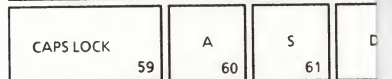
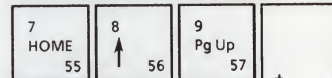
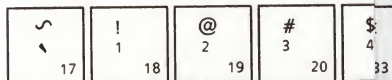
There are two models of this keyboard: one with 101 keys and one with 102 keys. The difference exists in a different configuration of the 'LEFT SHIFT' and 'ENTER' keys and one more function key is provided on the 102-key model (see next figures).

The keyboard automatically switches to one of three modes at power-on to provide the correct keyboard protocol:-

MODE 1: PC/XT protocol (9-bit data stream, scan code set 1)

MODE 2: AT protocol (11-bit data stream, scan code set 2)

MODE 3: AT protocol (11-bit data stream, scan code set 3)



X5589

ESC 1
----------

F1 2
---------

F2 3
---------

USE 16
-----------

NUM LOCK xxx
--------------------

CAPS LOCK xxx
---------------------

SCROLL LOCK xxx
-----------------------

17
----

! 1 18
-----------

" 2 19
-----------

£ 3 20
-----------

GE P 33
---------------

TAB 38
-----------

Q 39
---------

W 40
---------

GE EWN 54
-----------------

CAPS LOCK 59
--------------------

A 60
---------

S 61
---------

↑ 75A
----------

75B
-----

Z 76
---------

X 77
---------

CTRL 92
------------

ALT 93	→ 99
-----------	---------

NUM LOCK 34
-------------------

/ 35
------

* 36
------

- 37
------

7 HOME 55
-----------------

8 ↑ 56
--------------

9 Pg Up 57
------------------

+
---

4 ← 72
--------------

5 73
---------

6 → 74
--------------

58
----

1 END 88
----------------

2 ↓ 89
--------------

3 Pg Dn 90
------------------

ENTER
-------

0 INS 100
-----------------

. DEL 101
-----------------

91
----

X5590

## 22.7.2. Connections Honeywell Keyboard

PIN	SIGNAL VOLTAGE	FUNCTION
1	TTL	CLOCK
2	TTL	DATA
3	--	N.C.
4	0 V	GROUND
5	+5 VDC	POWER



# OPERATION MANUAL FOR KEYBOARD (FKB4700 SERIES)

## INSTALLATION

When installing the keyboard, make sure that the keyboard is not exposed to direct sunlight. Also, avoid installing it in a dusty place.

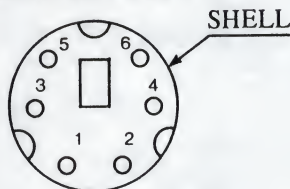
### (1) Connecting keyboard

The keyboard cable connects to the host computer with a 6 pin MINI-DIN or 5 pin DIN male connector. Fig 1 and 2 shows the pin configuration of the cable connector.

Please make sure before connecting the keyboard that the power of the host computer is turned off.

#### <KEYBOARD CABLE CONNECTOR>

##### MINI-DIN TYPE

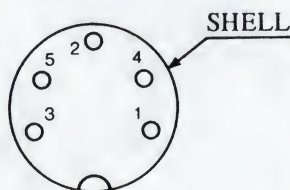


PIN No.	Signal
1	DATA
2	N.C.
3	GROUND (SG)
4	+5 Vdc
5	CLOCK
6	N.C.
SHELL GROUND (FG)	

Fig. 1

#### <KEYBOARD CABLE CONNECTOR>

##### DIN TYPE



PIN No.	Signal
1	CLOCK
2	DATA
3	N.C.
4	GROUND (SG)
5	+5 Vdc
SHELL GROUND (FG)	

Fig. 2



## 23. DEVICE ADAPTERS

Section:

Page:

1 : Technical Overview	23.1-1
1.1: Option Cross Reference Guide	23.1-1
1.2: Technical Data	23.1-2

2: Microsoft Bus Mouse Card	23.2-1	23.2-1	23.2-2	n.a.	23.2-2	n.a.
3: Smartcard Reader PE118	23.3-1	23.3-1	23.3-5	n.a.	23.3-6	23.3-6

Subsection:

1 Characteristics	↑
2 Connections	↑
3 Strap Settings / Adjustments	↑
4 Modification History	↑
5 Installation / Maintenance	↑
6 Diagnostic Functions	↑

**NOTE:** n.a. means that this section is not available for this unit.



## 23.1. TECHNICAL OVERVIEW

### 23.1.1. Option Cross Reference Guide

OPTION	P 2 1 2 0	P 2 2 3 0	A V E N G	P31xx					P32xx					P33xx							P 3 4 6 4	P 3 4 0 0	P91xx						
				0	0	0	0	2	0	0	0	0	3	3	0	0	4	4	5	6			7	0	3	3	6	6	7
				1	2	2	5	0	0	0	2	4	0	8	1	2	5	8	0	0			1	0	0	5	0	5	0
2: Microsoft Bus Mouse Card	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x			
3: Smartcard Reader PE118																													



## 23.1.2. Technical Data

SPECIFICATION	Bus Mouse Card
Primary I/O address	23CH-23FH
Secondary I/O address	238H-23BH
Interrupt requests	2, 3, 4 or 5

SPECIFICATION	Smartcard Reader PE118
Serial interface 1 (standard COM port)	
I/O addresses	2E8 (COM4), 2F8 (COM2), 3E8 (COM3), 3F8 (COM1)
Interrupt requests	IRQ3, 4 or NONE
Interface	V.24, V.28
Serial interface 2 (NEC78C10 microcontroller)	
I/O addresses	320, 328, 330, 338
Interrupt requests	IRQ3, 4, 5, 7, 9 or NONE
Interface	V.24, V.28
Dimensions (length x height)	254mm x 107mm

## **23.2. MICROSOFT BUS MOUSE CARD**

### **23.2.1. Microsoft Bus Mouse Card**

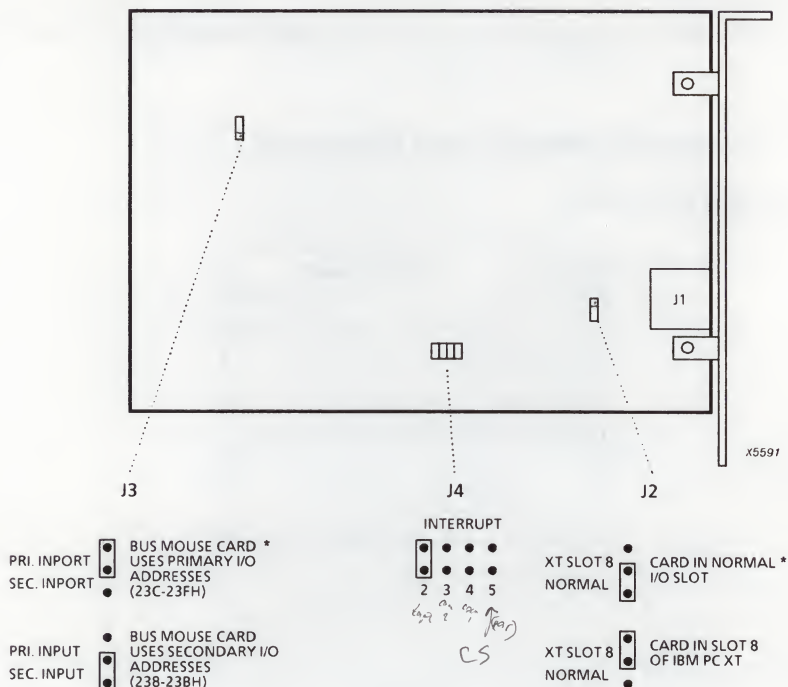
The Microsoft bus mouse card is used to interface the Microsoft bus mouse to the system.

### **23.2.2. Connections Microsoft Bus Mouse Card**

Mouse Interface Connector J1

PIN No.	SIGNAL NAME
1	Vcc
2	XAA
3	XBB
4	YAA
5	YBB
6	LEFT-SW
7	MID-SW
8	RIGHT-SW
9	Ground

### 23.2.3. Strap Settings / Adjustments Microsoft Bus Mouse Card



NOTE: \* INDICATES DEFAULT

### 23.2.5. Installation / Maintenance Microsoft Bus Mouse Card

The bus mouse card may be installed in any option board slot. Check the strap settings before installation, such that there will be no conflict in the interrupts or addresses used by the bus mouse card and other devices in the system.

## **23.3. SMARTCARD READER PE118**

### **23.3.1. Characteristics Smartcard Reader PE118**

A smartcard system can be used as an access control system to protect workstations from unauthorized access. It can also be used for other purposes (e.g. telephone cards, credit cards, etc.).

The smartcard reader PE118 consists of the following parts :-

- A CONBIN (CONtrol Boot Interface) controller board.
- The PSMC (Philips Security Micro Circuit).
- The operator card.
- The boot control authority card.
- An internal or external reader/encoder

A CONBIN controller board fits into a PC XT or AT slot. The CONBIN board contains two independant subsystems :-

- The microcontroller subsystem which provides the support for the boot control, the internal reader/encoder, the PSMC and a serial interface (eg. for an external reader).
- A standard COM port.

The PSMC is a smartcard chip mounted inside a 24 pin Dual-In-line Package (DIP). On the CONBIN board is a socket for this chip. The PSMC is required for authentication of the operator card during boot operation.

The operator card is necessary to allow successful boot operation.

The boot control authority card is used by the system manager to initialize the PSMC with the correct secret keys of the workstation and to personalize the operator cards.

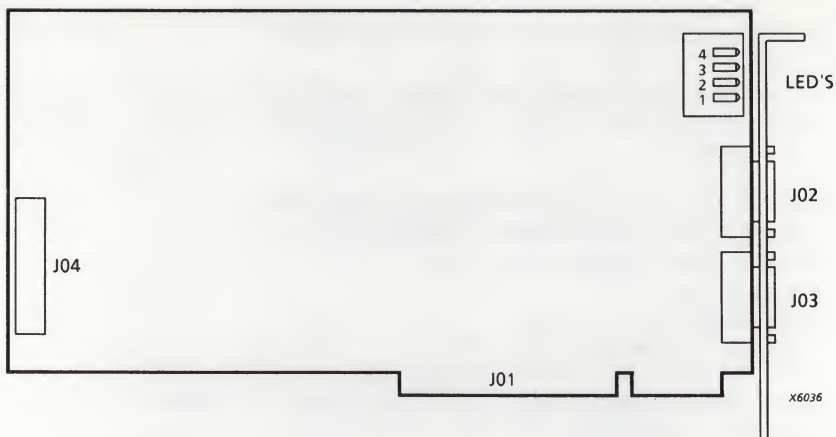
The internal reader/encoder is called MIREPC (Modular Integrated Reader Encoder for PC) which is an optional item. It fits into a floppy disk compartment of a PC. When not present an external reader can be used instead.

### **23.3.2. Connections Smartcard Reader PE118**

The CONBIN board has 4 connectors :-

- J01 connector (Option slot connector)
- J02 connector (Serial port of microprocessor controller)
- J03 connector (Serial COM port)
- J04 connector (TTL interface to internal reader)

The J01 connector is a standard option slot connector. For signal names see the system manual.



J02 connector :

PIN No.	SIGNAL NAME
1	NC
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	NC

J03 connector :

PIN No.	SIGNAL NAME
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

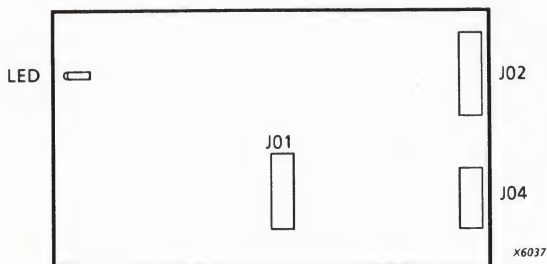


J04 connector :

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	GND	2	RESET
3	GND	4	DATA-IN
5	GND	6	DATA-OUT
7	GND	8	GRASP
9	GND	10	EJECT
11	GND	12	INCN
13	GND	14	ENDCN
15	MANUALN	16	LED
17	+ 5 Volt	18	+ 5 Volt
19	GND	20	GND
21	VPP	22	VPP
23	GND	24	GND
25	V5C	26	V5C

The internal reader has 3 connectors :-

- J01 connector (Motorized reader/encoder)
- J02 connector (TTL interface with CONBIN)
- J04 connector (Power supply)



J01 connector :

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	NC	2	GND
3	NC	4	GND
5	I/O	6	GND
7	CLK	8	GND
9	VPP	10	GND
11	RESETIN	12	V5C
13	NC	14	NC
15	NC	16	NC
17	GRASP	18	EJECT
19	INC	20	GND
21	ENDC	22	GND
23	+ 12 Volt	24	GND
25	+ 12 Volt	26	GND

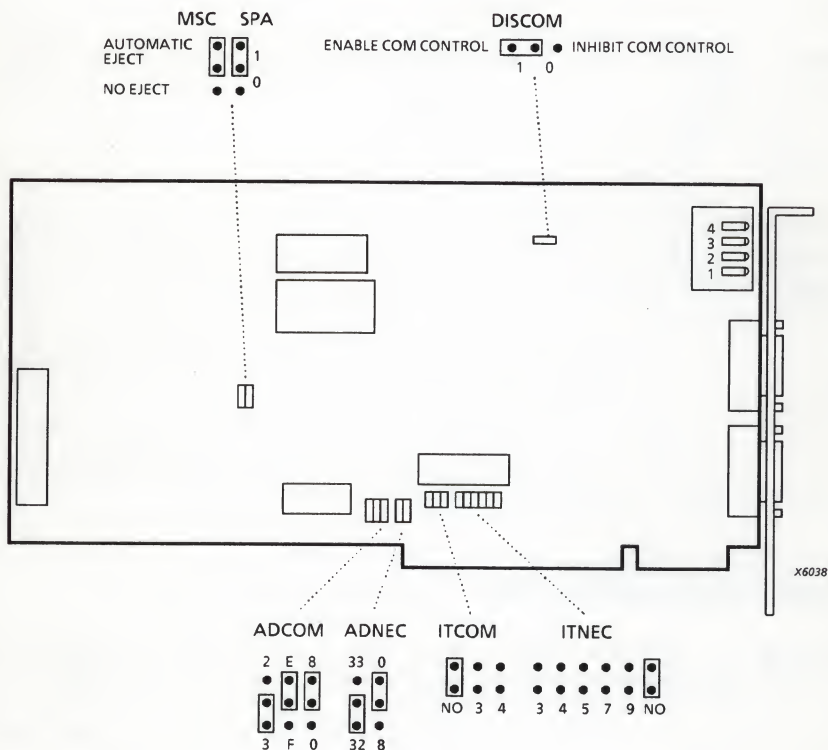
The J02 connector is the same as the J04 connector of the CONBIN card.

J04 connector :

PIN No.	SIGNAL NAME
1	Not used ( + 5V)
2	GND
3	GND
4	+ 12 Volt

### 23.3.3. Strap Settings / Adjustments Smartcard Reader PE118

The CONBIN board



Defaults given:

ADCOM: I/O address of COM controller

ADNEC: I/O address of 78C10 multicontroller

SPA: not used

ITCOM: I/O interrupt line of COM controller

ITNEC: I/O interrupt line of 78C10 multicontroller

### 23.3.5. Installation / Maintenance Smartcard Reader PE118

Check the strap settings of the CONBIN card. See to it that there are no I/O or interrupt conflicts. Put the CONBIN card in a XT or AT slot and the internal reader in a floppy drive compartment. Connect the cables.

After the hardware is installed, the installation process is carried on via software. This software package

- copies the necessary software onto disk,
- initializes the configuration files,
- reboot.

Personalization of the PSMC (if present) with the required parameters using a PSMC servicing tool is to be done by the user (customer) with the help of his user manual for security reasons. During this initialisation two timer values must be set :

Timer 1 : The system loading timer. This timer defines the maximum time interval the "security officer" allows for a work station to run its power-up self-test and load the operating system. This value must be chosen carefully or else the bus may be blocked too soon.

Timer 2 : The operator authentication timer. This timer defines the maximum time interval the "security officer" allows the operator to present the card, enter the PIN (Personal Identification Number) and obtain clearance to use the work station.

### 23.3.6. Diagnostic Functions Smartcard Reader PE118

The diagnostics program supplied with the smartcard will test the configuration. When an error is detected, an error message is displayed and the execution stops.

On the internal reader is a LED located that is used to define the state of the reader.

- LED not lighted : no card, no problem.
- LED lighted continuously : card present in connector.
- LED flashing slowly : a card must be put in connector.
- LED flashing SOS signal : hardware error during boot operations.

On the CONBIN board are 4 LEDs located (at the rear of the system) indicating error messages (see next table).

LED4	LED3	LED2	LED1	HEX	DESCRIPTION
0	0	0	0	0	Boot control terminated. No problems with the system.
0	0	0	1	1	PSMC error.
0	0	1	0	2	- 3 wrong PINS or - Cluster not found or - PC number not found or card out of date. Smart card error.
0	0	1	1	3	PSMC error.
0	1	0	0	4	PSMC error.
0	1	0	1	5	The used operator card does not contain the right key.
0	1	1	0	6	End of timer 2.
0	1	1	1	7	PSMC error.
1	0	0	0	8	End of timer 1.
1	0	0	1	9	Read error on PSMC.
1	0	1	0	A	PSMC error during power-on.
1	0	1	1	B	PSMC not personalized (LEDs switch off after 30 sec.).
1	1	0	0	C	PSMC not present (LEDs switch off after 30 sec.).
1	1	0	1	D	EPROM not OK.
1	1	1	0	E	SRAM not OK.
1	1	1	1	F	Situation during power-on (10-20 sec.).



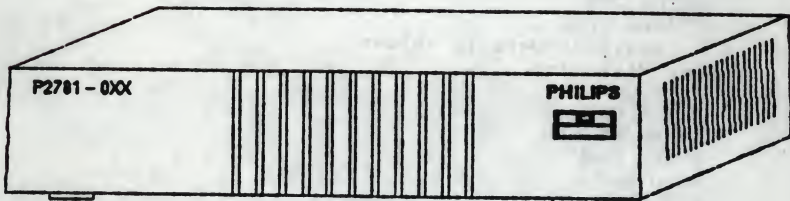


D. Bijlsma  
~~Cirpka~~

# P2781

(Preliminary Description)

October, 5. 1988



PHILIPS Kommunikations Industrie AG

D-5900 SIEGEN, Eisfelderstr. 316

Prepared by J. Berkenheide 0271/380 - 2508

and T. Soemer 0271/380 - 2508

## **P2781-0XX - Preliminary Description**

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# 1. Scope

The intention of this paper is to offer a brief overview of the P2781-0XX and the operator handling necessary to get it running until a more detailed handbook is published. It includes a short summary of the general features, the delivered hardware / software configuration, possible extensions and the default jumper settings. The last chapter shall serve as a quick reference in case of trouble.

Philips P2781 ROM BIOS - Version 01.00 (89-08-04), rev. 806862

Copyright (c) 1989 P

All Rights Reserved

Memory Found: 640kB

PHILIPS COMMUNICATION BIOS - Version 7.02 (8-



## **P2781-0XX - Preliminary Description**

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### **1.1 General Features**

The P2781 (Diskless PC) is based on the 80286 microprocessor and offers a PC-AT compatible design (see Figure 1 in the Appendix) with the following features :

- CPU clockrate may be either 10, 12 or 16 MHz and is software switchable to half of the standard frequency for power consumption reasons
- optional maths co-processor 80287
- designed around a high integrated chipset in a very small cabinet (W:360 mm, D: 380 mm, H: 80 mm), which fits underneath a 14"-monitor
- Paged Interleave Memory Controller for optimal RAM access timing allows usage of relatively slow and cheap memory modules (e.g. 0 Wait States at 10 MHz with 150 ns DRAMs)
- RAM expandable up to 8 Mb with 0 wait states for all clock rates (suitable RAM speed or page-interleaving supposed)
- Shadow RAM for faster execution of ROM-BIOS
- Lotus Intel Microsoft Expanded Memory Specification (LIM-EMS Version 4.0 on software level)
- 128 Kb (+ optional 32 Kb) ROM for BIOS and firmware
- I/O-Channels:
  - DMA-controller for fast 8/16 bit memory transfers
  - Real Time Clock with 114 bytes of nonvolatile RAM
  - 3 Timer Counter Channels
  - 15 Hardware Interrupt Request Channels
- Auxiliary device interfaces:
  - 2 serial ports
  - 1 parallel port
  - 1 speaker interface (two software selectable sound levels)
  - 1 operator panel
  - hardware interface for PS/2 mouse (not yet SW supported)
- Video Graphics Array supports monitors with analog interface compatible to IBM PS/2. The smart auto-emulation adjusts automatically to the following graphic modes application software dependent:
  - IBM PS/2 VGA
  - IBM EGA
  - IBM CGA
  - IBM MCA
  - Hercules Adapter



## P2781-0XX - Preliminary Description

- Optional battery back up unit, protecting against temporary power break downs
- 2 AT compatible slots: one of them can hold a smaller footprint board only and is reserved for the PHILIPS LAN adapter.

Philips  
P2781-0XX  
Preliminary Description  
1987

## P2781-0XX - Preliminary Description

### 1.2 P2781 Versions

There are six versions of the P2781. Differences relate only to CPU and RAM characteristics. The following schedule lists the available models. Note that all options can be installed into all P2781 models:

P-Code	fClock	RAM		RAM SPEED			Mains
		standard	maximum	80 C212 0WS	C212 0WSIL	C212B 0WSPM	
P2781-001	10 MHz	1 M8	5 M8	100ns	150ns	150ns	220V
P2781-002	10 MHz	1 M8	5 M8	"	"	"	110V
P2781-003	12 MHz	2 M8	8 M8	80ns	120ns	120ns	220V
P2781-004	12 MHz	2 M8	8 M8	"	"	"	110V
P2781-005	16 MHz	2 M8	8 M8	---	100ns	100ns	220V
P2781-006	16 MHz	2 M8	8 M8	---	"	"	110V

#### Note:

From the beginning of 1989 a new DRAM controller (82C212B) will be used. In contrast to the older type (82C212) this device is able to run Pagemode even if a single bank is used. So the slower and cheaper DRAM type will be suited for all cases.

"0WS" means that every access will be driven with 0 Wait States.

"0WSIL" means 0 Wait States only in Page/Interleave Mode. Page/Interleave Mode requires an even number of banks. Since not all accesses will have 0 wait states an average count of 0.7 wait states will occur.

"0WSPM" means 0 Wait States only in Paged Mode. This can be achieved with any number of banks you like. However the hit rate is slightly worse, since the page size is half of that in Page/Interleave Mode. This mode is only available if using the 82C212B.

All other features are unique for all models

Def-Default: "A" means that within a standard P2781-001 the jumper is in the inserted or 1-2 position !

\* : strap is factory fixed

Jumper	Def	Inserted / posit. 1-2	not inserted / pos. 2-3
W1	B	Video 8 bit ROM	Video 16 bit ROM
W2	B	PS/2 mouse enabled	PS/2 mouse disabled
W3	A	PS/2 mouse disabled	PS/2 mouse enabled
W4	B	PS/2 mouse enabled	PS/2 mouse disabled
W5	A	PS/2 mouse disabled	PS/2 mouse enabled
W6	B	PS/2 mouse enabled	PS/2 mouse disabled
W7	A	Col. Display primary	Monoc. Display primary
W8	A	system clock = floc	system clock = text
W9	B	math clock: fin=fCPU	math clock: fin=text
W10	A	normal operation	NVRAM clear
W11	A	Burst Refresh disable	Burst Refresh enable
W12	A	NEAT chipset REV.B	NEAT chipset REV.A
W13	A	NEAT chipset REV.B	NEAT chipset REV.A
W14	A	NEAT chipset REV.B	NEAT chipset REV.A
W15	B	shield = ground	sh. separe. from grou.
W16	A	math clock: fin=text	math clock: fin=fCPU
W17	B	Video BLANK level=0V	Video BLANK level>0.2V

Default Jumper Settings

## Jumper Settings and Component Plan

P2781-0XX - Preliminary Description



1.3 Available options

The P2781 is delivered in one of the versions described in the section before. For expansion the following field installable options are available:

Option	P-Code
Battery backup unit	P2780-010
512 K8 Memory Bank (120 ns)	P2780-020
2 M8 Memory Bank (100 ns)	P2780-030
(see Table 1 in chapter 3.)	P2780-040
maths co-processor 80287/8	

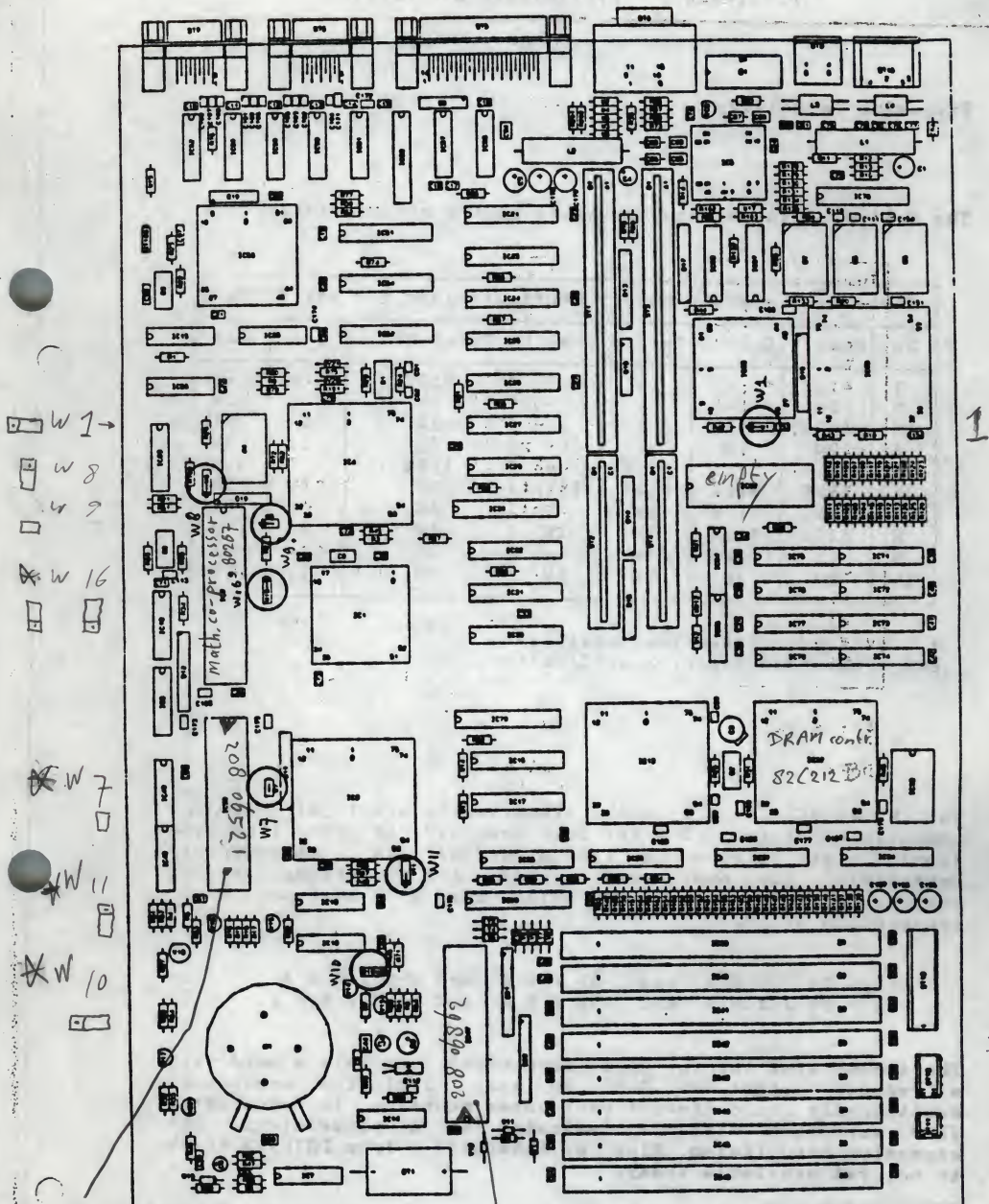
1.4 Special Key Codes of the P2781

Some special features of the P2781 can be switched on or off with special key strokes:

CTRL - ALT - DEL = Warm Start (Standard)  
 CTRL - ALT - - = Switch CPU speed to a half (5, 6, 8 MHz)  
 CTRL - ALT - + = Switch CPU speed to full speed  
 CTRL - ALT - 8 = Higher speaker sound level  
 CTRL - ALT - 2 = Lower speaker sound level  
 ("2" and "8" are keys of the numeric part of the keyboard!)  
 CTRL - ALT - ESC = Enter Setup Mode  
 (Inputs will become valid after Reset)

Note: If a keyboard is used whose layout differs from the US-version the aforesaid functions are only available if at first the SYSREQ key is pushed. This key toggles the current keyboard driver between the US- and the actual version.

# P2781-0XX - Preliminary Description



PHILIPS COMMUNICATION BIOS  
V2.02 (89-07-04) 208 06521  
Fuj MB2 8742H

ROM BIOS V01.00 (89-08-04) rev. 806862  
AMD 27C1024 - 225 208 06862



# P2781-0XX - Preliminary Description

## Expansion Capability

The following table shows possible memory configurations:

Table 1: Possible Memory Configurations for the P2781							
No.	Bank 0	Bank 1	Bank 2	Bank 3	Total Mem.	I-L	EMS
1	512K	-	-	-	512K		-
2	2M	-	-	-	2M		1M
3	512K	512K	-	-	1M	I	384K
4	2M	2M	-	-	4M	I	3M
5	512K	512K	512K	-	1.5M		512K
6	512K	512K	512K	512K	2M	I	1M
7	512K	512K	2M	-	3M		2M
8	512K	512K	2M	2M	5M	I	4M
9	2M	2M	2M	-	6M		5M
10	2M	2M	2M	2M	8M	I	7M

I = Page/Interleaving possible  
 EMS = Expanded Memory Specification

The P2781-0XX has 2 on the electrically point of view AT compatible slots. One (at left hand side if seen from the front; see figure in the appendix) is mechanically compatible too and well suited for inserting any AT compatible adapter card which has a maximum power consumption of :

- a) 5V / 2.5 A and -5V / 0 A and +12V / 0 A or
- b) 5V / 1.0 A and -5V / 0 A and +12V / 0.5 A.

The second slot (at the right hand side) can hold a card with a reduced height of 8.5 cm max. inclusive connector. Additionally a different rear cover mounting is necessary. This expansion slot is dedicated to a proprietary LAN expansion card (Token Ring or Ethernet) from PHILIPS which is not yet available today.

#### 4. Software

The master floppy disk delivered together with the P2781 Demo units contains the following software modules:

##### Necessary Programs

- SETUP.COM
- SETNEAT.COM

##### Useful Utilities

- EMM.SYS
- MIPS.COM
- PINIT.COM
- RANDRIVE.COM
- SOUND.COM
- DEMO.BAT

This chapter gives a short description how to use these programs.

#### 4.1 Necessary Software

These programs are necessary to configure the system (SETUP.COM) and the chipset from Chips & Technologies (SETNEAT.COM).

*if a BIOS coming from other vendors than Philips, is used !!*

##### 4.1.1 SETUP.COM

This program provides an easy and very quick way to change the actual hardware configuration (size of base and expansion memory and default video graphics type) including the contents of the Real-Time-Clock (date and time). In order to make changes resident use the 'Write' option to quit the program.

*Do not use with Philips BIOS*



# P2781-0XX - Preliminary Description

## 4.1.2. SETNEAT.COM, SETNEAT1.COM

This program allows to change the default setting of hardware parameters including the establishment of Expanded Memory and Shadow RAM. The actual configuration can be saved to or restored from disk/server. Because of the menu-driven user interface the handling of the program is very easy. See table 2 for possible configurations in relation to the P2781 version. For activating the new configuration parameters the system must be rebooted.

For a suitable programming of the 82C212B a new version of this utility is necessary (SETNEAT1.COM).

*Do not use with Philips 2805*

## 4.1.2.1 Register Default Values

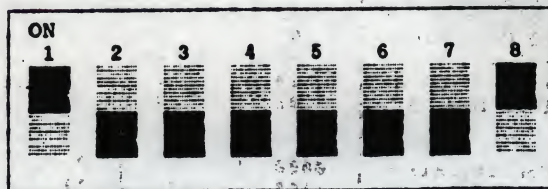
Table 2: Default values for P2781 chip initialization

CPU Clock Frequency	10 MHz	10 MHz	12 MHz	16 MHz
AT-Bus Frequency	10 MHz	5 MHz	6 Mhz	8 MHz
82C206				
XIOR/XIOW Wait States	11	00	01	10
16 bit DMA Wait States	00	00	00	00
8 bit DMA Wait States	00	00	00	00
EMR bit	0	0	0	0
DMA Clock	0	0	0	0
82C211				
Processor Clock Select	0	0	0	0
Ready Timeout Enable	1	1	1	1
Additional Add Hold Ti	0	0	0	0
Quick mode	1	1	1	1
AT Bus 16bit Com.Delay	00	00	00	00
AT Bus 8 bit Com.Delay	01	01	01	01
AT Bus I/O Com.Delay	01	01	01	01
16 bit AT Bus Wait St.	10	01	01	01
8 bit AT Bus Wait St.	10	01	01	01
AT Bus Clock Source	01	00	00	00
82C212				
RAM/ROM Configuration	0000	0000	0000	0000
RAM/ROM Control	1100	1100	1100	1100
512K/640K Address Map	1	1	1	1

Map RAM at A0000				
- BFFFF	00000000	00000000	00000000	00000000
MAP RAM at C0000				
- DFFFF	00000000	00000000	00000000	00000000
Map RAM at E0000				
- FFFFF	00000000	00000000	00000000	00000000
Bank 0/1 DRAM type	* 10	* 10	* 10	* 10
Bank 0/1 number of Ba.	* 0	* 0	* 0	* 0
Bank 2/3 DRAM type	* 00	* 00	* 00	* 00
Bank 2/3 number of Ba.	* 00	* 00	* 00	* 00
DRAM Access State	* 1	* 1	* 1	* 1
Interleaved Page Mode	* 0	* 0	* 0	* 0
Relocate DRAM at 1 MS	0	0	0	0
EMS Enable	0	0	0	0
EMS Wait State	00	00	00	00
RW-ROM Wait State	01	01	10	11
EMS Base Address	0100	0100	0100	0100
EMS Base Reg. IO base	0101	0101	0101	0101
EMS Page 0 - Position	00	00	00	00
EMS Page 1 - Position	00	00	00	00
EMS Page 2 - Position	00	00	00	00
EMS Page 3 - Position	00	00	00	00
EMS Size (Hex.)	1	1	1	1
DTO-RAS Time Out Enab.	0	0	0	0
PGA20-Gate A20 Control	0	0	0	0
Setup Shadow RAM				
Shadow for ROM BIOS	0	0	0	0
Shadow Video RAM	0	0	0	0

\* marked values have to be adapted to the used memory extension

#### 8-bit Wide Dip Switch:



The above shown figure describes the Default setting of the on board Dip Switch.



# P2781-0XX - Preliminary Description

## Switches <4:1>

1	2	3	4	Primary	Secondary
OFF	OFF	OFF	OFF	Monochrome/CGA	PS/2
OFF	OFF	OFF	ON	EGA RGB 80X25	Monochrome/None
OFF	OFF	ON	OFF	EGA Monochrome	CGA 80X25 /None
OFF	OFF	ON	ON	Monochrome	EGA Hi Res Enh
OFF	ON	OFF	OFF	Monochrome/CGA	Multi-frequency
OFF	ON	OFF	ON	CGA RGB 80X25	EGA Monochrome
OFF	ON	ON	OFF	EGA HiEnh 80X25	Monochrome/None
OFF	ON	ON	ON	Monochrome	EGA RGB 80X25
ON	OFF	OFF	OFF	PS/2	Mono/CGA/None
ON	OFF	OFF	ON	EGA RGB 40X25	Monochrome/None
ON	OFF	ON	OFF	EGA Monochrome	CGA 40X25/None
ON	OFF	ON	ON	Monochrome	EGA HiRes 80X25
ON	ON	OFF	OFF	Multi-frequency	Mono/CGA/None
ON	ON	OFF	ON	CGA RGB 40X25	EGA Monochrome
ON	ON	ON	OFF	EGA HiRes 80X25	Monochrome/None
ON	ON	ON	ON	Monochrome	EGA RGB 40X25

Switch 5 : (OFF) Analog Monitor  
(ON) Digital Monitor

Switch 6 : (OFF) CGA Emulation enabled  
(ON) CGA " disabled

Switch 7 : (OFF) All VGA-Registers at I/O Address 3XXh  
(ON) " " 2XXh

Switch 8 : (OFF) Battery is disconnected from NVRAM/RTC  
(ON) " " connected to NVRAM/RTC



## 4.2 Useful Utilities

These programs are useful tools to demonstrate features of the P2781-0XX or to install some hardware possibilities.

### 4.2.1 MIPS.COM

This tool demonstrates the performance of the P2781 in comparison with some competitor's products.

### 4.2.2 PINIT.COM

This short utility initializes the V.24 ports, printer port and the operator panel interface. It is only for those who use a BIOS from other vendors than PHILIPS. The functionality of this program is included in the PHILIPS BIOS and therefore PINIT.COM is of no use for this BIOS type.

*Do not use with Philips BIOS*

### 4.2.3 RAMDRIVE.SYS

If you want to use memory above 1 Mb as a RAM-Drive, you can establish these option by including the following expression in the DOS-configuration file CONFIG.SYS:

**DEVICE = RAMDRIVE.SYS Memory\_Size Sector\_Size Dir\_Entries/E**

**Memory\_Size** : Memory in KBytes available for the RAM-Drive

**Sector\_Size** : Storage size of one Sector (normally 512)

**Dir\_Entry** : Number of directory entries in the root

**Option /E** : Establish the RAM-Drive above 1 MByte

## P2781-0XX - Preliminary Description

### 4.2.4 SOUND.COM

This short program demonstrates the speaker capabilities. Especially it is well suited to test the two loudness levels (CTRL-ALT-8/CTRL-ALT-2) or the half performance mode (CTRL-ALT--/CTRL-ALT-+).

### 4.2.5 DEMO.BAT

This batch utility calls two other programs which show a VGA demo.

### 4.2.6 EMM.SYS ; NEATEMM.SYS

The intention of this system program is to install a device driver for the Expanded Memory as configured for the 82C212 with SETNEAT. The driver is loaded at boot-time if CONFIG.SIS contains the command:

**DEVICE = EMM.SYS -Ix -My -Pzz -D**

**x**: hexadecimal number which specifies the I/O address (hex 2x8) to enable EMS pages. x may be 0,1,5,6,A,B or E.

**y**: number between 1 and 5 used to select the EMS page frame address (64K window). 1 -> C0000h 2 -> C4000h 3 -> C8000h 4 -> CC000h 5 -> D0000h

**z**: maximum number of open processes between 1 and 128 (default 64)

**D**: enable EMS diagnostics



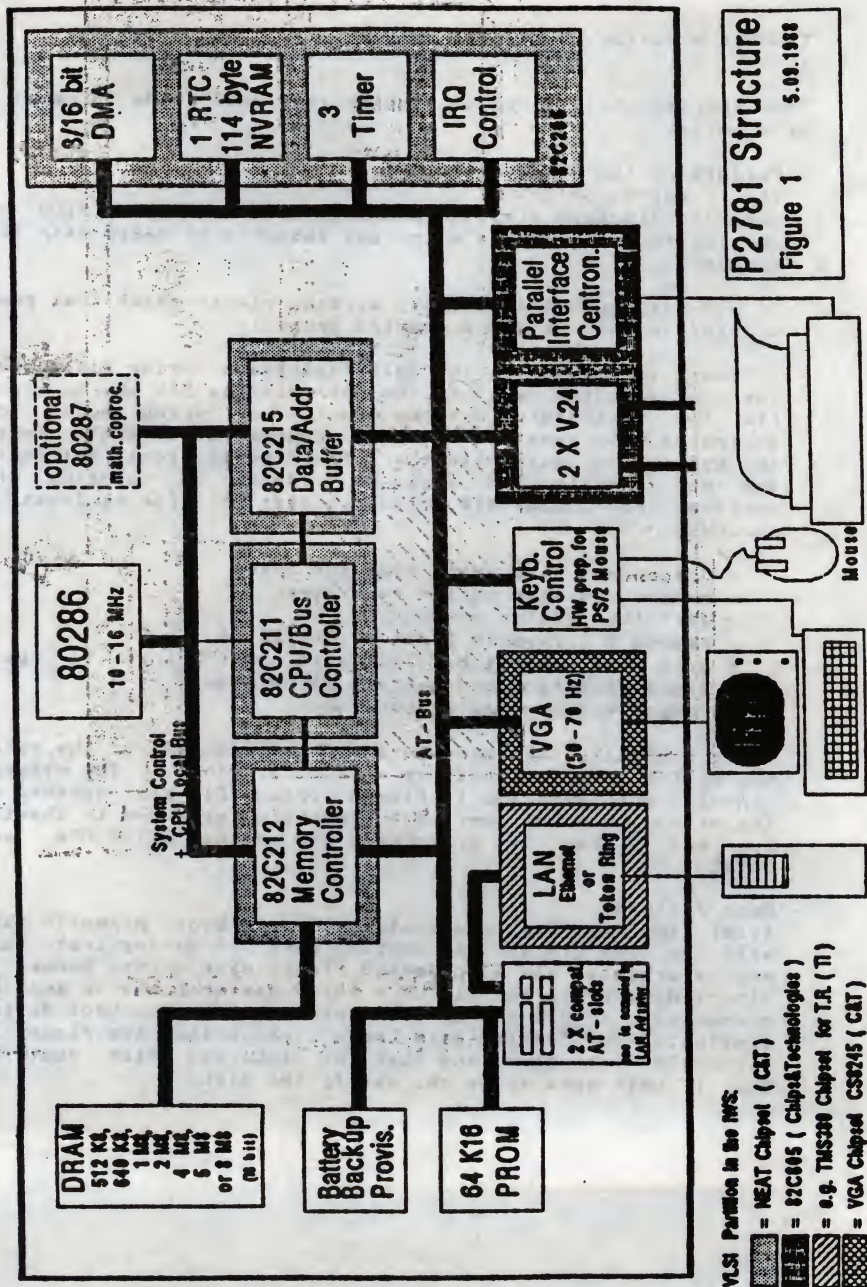
## 5. Trouble shooting

This chapter shall serve as a quick reference guide in case of trouble.

- **Failure of the Power-On-Self-Test**  
The Power-On-Self-Test normally displays a special message of the Philips BIOS on the screen and produces a typical sequence of beeps with the speaker.
- If you get sound but an empty screen, please check that your monitor is working and connected properly.
- If you get no sound or the Self Test stops during RAM-Check, the configuration saved in the non-volatile RAM may be wrong (to few wait states, wrong modules or wrong mode) or destroyed. To reset the actual configuration and to force the system to work with the default (uncritical) settings, the non-volatile RAM must be cleared by changing the position of jumper W10 (see chapter 3) for at least 2 seconds:
  - disconnect the unit from the mains
  - remove 3 screws on the rear cover
  - lift the plastic cover
  - remove 2 screws in front of the P2781
  - open the cabinet by sliding it about 1 inch to the front direction and lifting it upwards
  - Jumper W10 now can be accessed

After finishing this procedure and replacement of the cover the system shall start up without problems. The message 'Invalid configuration ! Please press <F1>-Key' appears on the screen. Now the correct configuration as shown in chapter 2 and 3 can be programmed by using SETUP.COM and SETNEAT.COM.

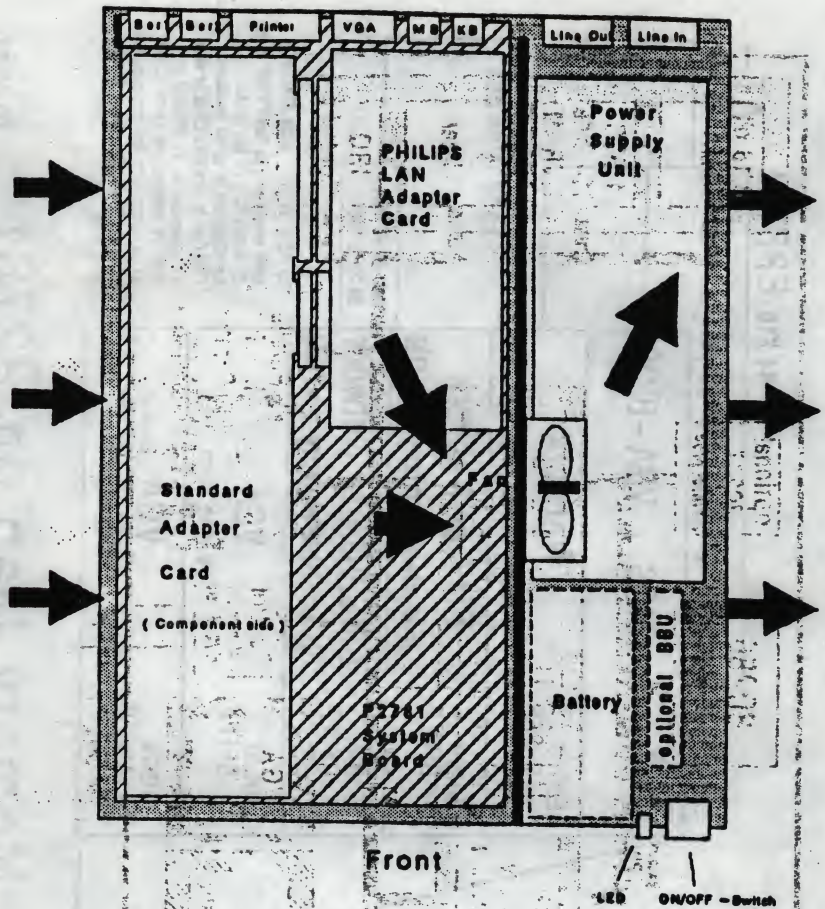
- **Boot-Failure**  
After the Self-Test the system tries to boot. Normally this will be done via the LAN adapter card but during test this may be achieved via a connected floppy disk drive. Hence, a floppy disk drive containing a MSDOS-Master-Diskette must be connected. If you get an error-message like 'No boot device available' or 'Fehler beim Laden', check that the floppy is correctly connected and that the inserted disk contains DOS. If both seem to be ok, verify the disk.



**P2781 Structure**  
Figure 1 5.05.1988



Rear



Front

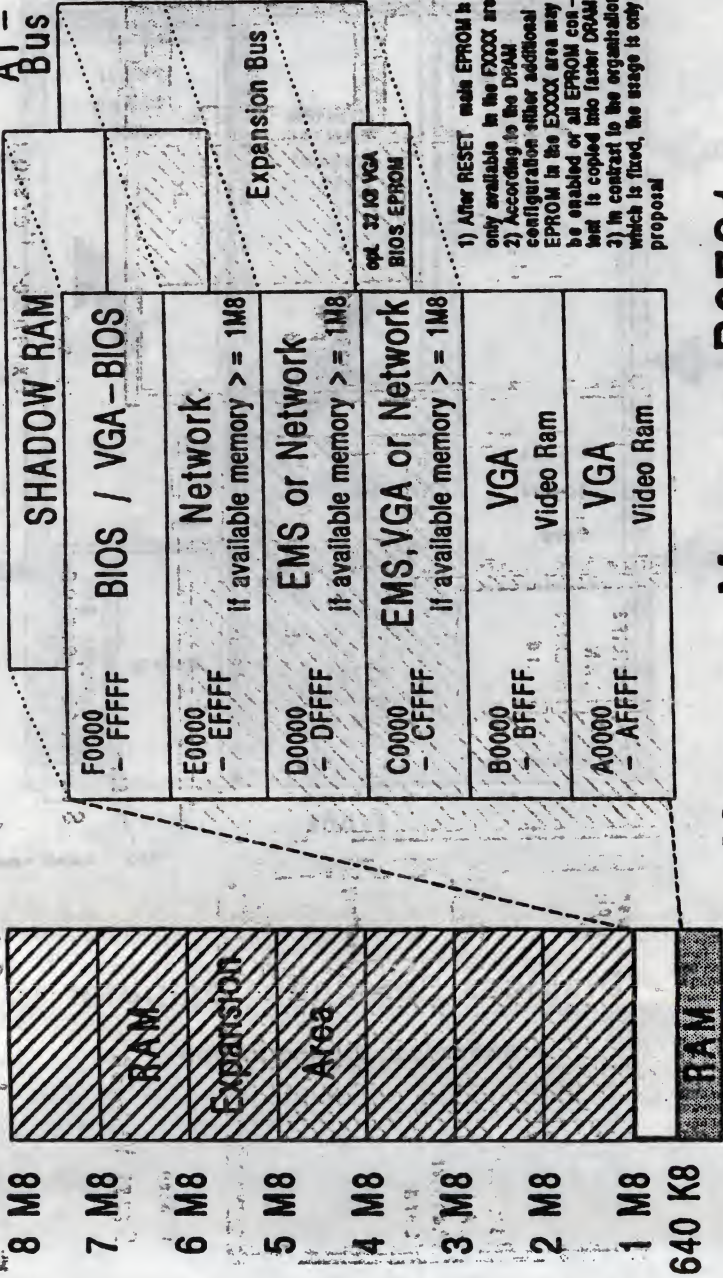
## Diskless Personal Computer

### Mechanical Construction

09.03.00

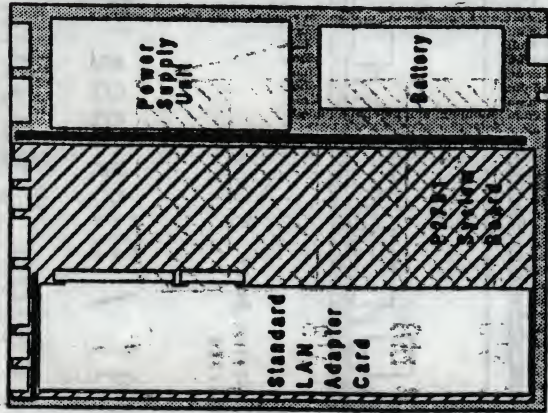


219201294010 64 K16 EPROM AT-Bus

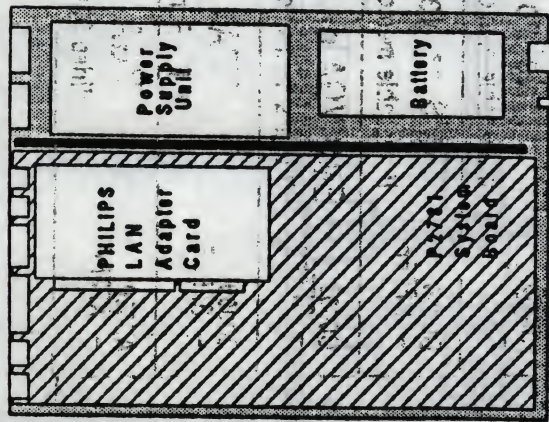


- 1) After RESET, made EPROM is only available in the F0000 area
- 2) According to the DRAM configuration either additional EPROM in the E0000 area may be enabled or all EPROM content is copied into faster DRAM
- 3) In contrast to the organization which is fixed, the usage is only a proposal

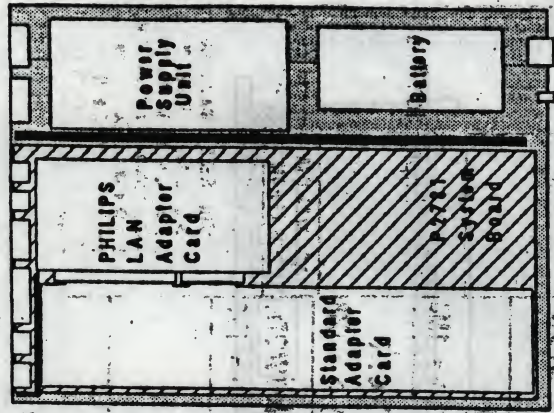
# Memory Map on P2781



1. step  
Start Version



2. step  
Standard Version



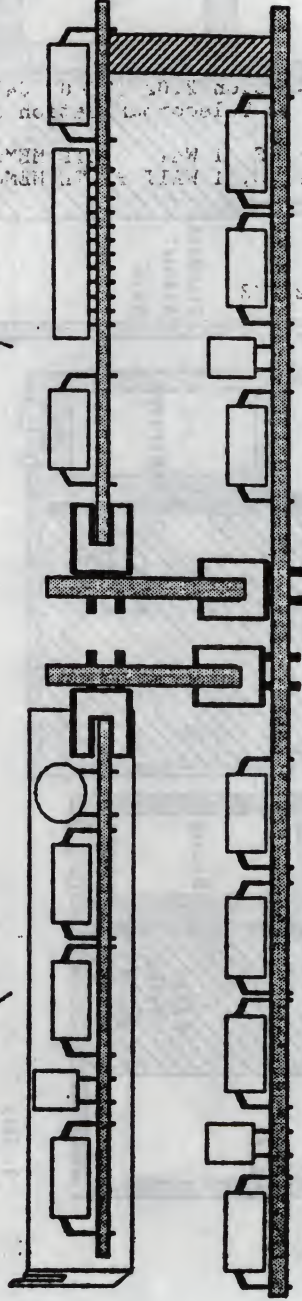
3. step  
Extended Version

# Extension Stepping



Standard AT-card

Special LAN Extension Card



P2781 System Board  
SB-1WS/286

**P2781 / Diskless PC  
Extension Capability**

05.00.08

Philips P2781 ROM BIOS - Version 01.00 (89-08-04), rev. 806862  
Copyright (c) 1989 Philips Telecommunication and Data Systems  
All Rights Reserved

Memory Found: 640 KB

PHILIPS COMMUNICATION BIOS - Version 2.02 (89-07-04)

Copyright (c) 1988, 1989 Philips Telecommunication and Data Systems

BANK 0 - 512K PAGED, 256K DRAM S, 1 WAIT STATE MEMORY

BANK 1 - 512K PAGED, 256K DRAM S, 1 WAIT STATE MEMORY

BANK 2 - DISABLED

BANK 3 - DISABLED

BIOS SHADOW RAM ENABLED

VIDEO SHADOW RAM ENABLED

PROCCLK = CLK2IN BCLK = CLK2IN/2

LAN BOOT

LAN RETRY

LAN RETRY

LAN RETRY

LAN RETRY

LAN RETRY

2014-03-20

2014-03-20

2014-03-20

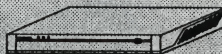
2014-03-20

*[Faint, illegible markings]*

*[The page contains extremely faint, illegible markings that appear to be bleed-through from another document.]*



## Memory Upgrade for P2783 models

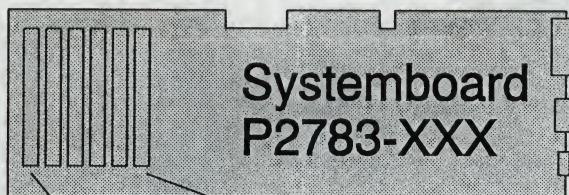


Available Memory Extension Kits:

P2780-021 = 2 X 256K9

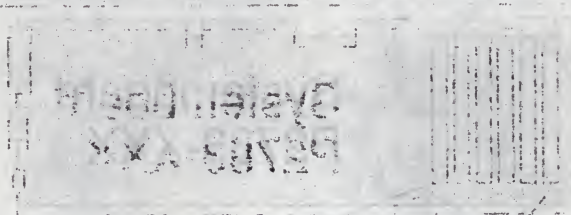
P2780-031 = 2 X 1M9

P2780-041 = 2 X 4M9



Total Memory	Configuration of Memory Modules:						Basic configuration of model:
	Bank 1		Bank 2		Bank 3		
	M-slot1	M-slot2	M-slot3	M-slot4	M-slot5	M-slot6	
1 M8	256 K9	256 K9	256 K9	256 K9	—	—	P2783-001
1.5 M8	256 K9	256 K9	256 K9	256 K9	256 K9	256 K9	P2783-002/003
2 M8	1 M9	1 M9	—	—	—	—	
2.5 M8	1 M9	1 M9	—	—	256 K9	256 K9	
3 M8	256 K9	256 K9	256 K9	256 K9	1 M9	1 M9	P2783-004
4 M8	1 M9	1 M9	1 M9	1 M9	—	—	
4.5 M8	1 M9	1 M9	1 M9	1 M9	256 K9	256 K9	
6 M8	1 M9	1 M9	1 M9	1 M9	1 M9	1 M9	
8 M8	4 M9	4 M9	—	—	—	—	
9 M8	256 K9	256 K9	256 K9	256 K9	4 M9	4 M9	
10 M8	1 M9	1 M9	—	—	4 M9	4 M9	P2783-005
12 M8	1 M9	1 M9	1 M9	1 M9	4 M9	4 M9	
16 M8	4 M9	4 M9	4 M9	4 M9	—	—	

CHARTERED



1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736 2737 2738



# CUSTOMER INFO

No.: 1  
Date: 10/90  
Product: P 2783

## Memory Upgrade for P2783 models

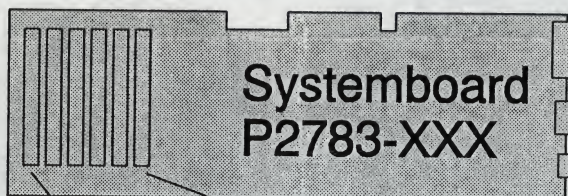


Available Memory Extension Kits:

P2780-021 = 2 X 256K9

P2780-031 = 2 X 1M9

P2780-041 = 2 X 4M9



Total Memory	Configuration of Memory Modules:						Basic configura- tion of model:
	Bank 1		Bank 2		Bank 3		
	M-slot1	M-slot2	M-slot3	M-slot4	M-slot5	M-slot6	
1 M8	256 K9	256 K9	256 K9	256 K9	—	—	P2783-001
1.5 M8	256 K9	256 K9	256 K9	256 K9	256 K9	256 K9	P2783-002/003
2 M8	1 M9	1 M9	—	—	—	—	
2.5 M8	1 M9	1 M9	—	—	256 K9	256 K9	
3 M8	256 K9	256 K9	256 K9	256 K9	1 M9	1 M9	P2783-004
4 M8	1 M9	1 M9	1 M9	1 M9	—	—	
4.5 M8	1 M9	1 M9	1 M9	1 M9	256 K9	256 K9	
6 M8	1 M9	1 M9	1 M9	1 M9	1 M9	1 M9	
8 M8	4 M9	4 M9	—	—	—	—	
9 M8	256 K9	256 K9	256 K9	256 K9	4 M9	4 M9	
10 M8	1 M9	1 M9	—	—	4 M9	4 M9	
12 M8	1 M9	1 M9	1 M9	1 M9	4 M9	4 M9	P2783-005
16 M8	4 M9	4 M9	4 M9	4 M9	—	—	







